3.17 Geology and Soils

The soils and geology characteristics of the Utah County and southern Salt Lake County valleys are presented from a regional perspective. The impacts that the project alternatives would have on these soils, and the constraints the geologic and soils characteristics may place on construction of Alternative 4 are described in this section.

3.17.1 Affected Environment

The majority of the project lies in Utah County, in northern Utah's urban corridor just south of Salt Lake Valley. Utah Valley lies at the center of Utah County, lined on the east by the Wasatch Mountains. Utah Lake, a natural fresh water lake, occupies a large part of the valley. All rivers in the valley flow into Utah Lake, which empties into the Jordan River to the north. The northernmost five miles of the project alignment is located in Salt Lake Valley, separated from Utah Valley by the Traverse Mountain Ridge. Salt Lake Valley in Salt Lake County is bound by the Wasatch Mountain Range to the east and by the Oquirrh Mountain Range to the west.

Utah Valley and Salt Lake Valley lie on the eastern edge of the Basin and Range physiographic province. The Basin and Range province, extending from western Utah to the west through most of Nevada, consists of linear valley basins divided by several north-south trending mountain ranges. The Utah and Salt Lake valleys consist of deep basins filled with quaternary deposits.

Much of Salt Lake and Utah valleys, including the portion of I-15 under study, consists of sediments deposited during the time of Lake Bonneville, or during its various phases of fluctuations. These materials (late Pleistocene or younger in age) consist of interbedded silt, silty clay and fine sand at lower elevations with coarse sand and gravel along former beach lines.

From Payson to Springville, surficial soils consist of predominantly Lake Bonneville deposits of the Provo Shoreline era. From Springville to Lehi, where I-15 flanks the eastern shore of Utah Lake, native soils consist of predominantly post-Bonneville stream deposits and very recent lake deposits. North of Lehi into southern Salt Lake County, native soils consist of predominantly Lake Bonneville deposits with age distinguished by features of the Provo Shoreline (14,000 to 13,000 years old) (Anderson et al 1986).

Seismicity and Faulting

Tectonic activity in the region has also shaped the existing topography. Utah and Salt Lake valleys lie within the Intermountain Seismic Belt (ISB), a delineated zone of numerous fault traces and historical earthquakes in the Intermountain West. The ISB is located near the eastern boundary of the Basin and Range province, and extends from northwestern Montana southward for approximately 800 miles to northern Arizona. Since 1850, at least 16 earthquakes of magnitude 6.0 or greater have occurred within the ISB; however, none of these events occurred on any faults in the Salt Lake or Utah valleys.

The Wasatch fault along the western base of the Wasatch Mountains is considered to be the primary seismic source. The Wasatch fault extends approximately 200 miles from Malad City, Idaho to Fayette, Utah, and is comprised of ten segments. Five of these –Nephi, Provo, Salt Lake City, Weber, and Brigham City – comprise the central segments of the Wasatch fault.

The southernmost portion of the I-15 corridor is located very close to the Nephi fault segment. In Payson, the northern tip of the Nephi fault segment crosses the I-15 alignment. Between Payson and the Traverse Mountains, which mark the boundary between the Salt Lake City and Provo fault segments, the remainder of the project alignment is located approximately 0.5 to 5 miles west of the Provo fault segment. At Point of the Mountain, the Wasatch fault veers sharply to the east and is located 5 to 8.5 miles away from I-15. The uppermost three miles of the project alignment, from Point of the Mountain (in the Traverse Mountains) to 12300 South, is located approximately 2.5 to 3.5 miles west of the Salt Lake City fault segment (Hecker, 1993).

The largest probable earthquake anticipated for Utah is a magnitude 7.0 to 7.5 earthquake on the Wasatch fault. The composite recurrence interval for earthquakes greater than magnitude 7 on the central segments of the Wasatch fault is 350 years. On any one segment, the average recurrence interval ranges from about 1200 to 2600 years. The last large earthquake occurred about 600 years ago on the Provo segment (Utah Geological Survey, 1996).

Liquefaction may occur when water-saturated sandy soils are subjected to earthquake ground shaking. When soil liquefies, it loses strength and behaves as a viscous liquid (like quicksand) rather than as a solid. This can cause buildings to sink into the ground or tilt, empty buried tanks to rise to the ground surface, slope failures, nearly level ground to shift laterally tens of feet (lateral spreading), surface subsidence, ground cracking, and sand blows.

Liquefaction has caused significant property damage in many earthquakes around the world, and is a major hazard associated with earthquakes in Utah. The 1934 Hansel Valley and 1962 Cache Valley earthquakes caused liquefaction, and large prehistoric lateral spreads exist at many locations along the Wasatch Front. The valleys of the Wasatch Front are especially vulnerable to liquefaction because of susceptible soils, shallow ground water, and relatively high probability of moderate to large earthquakes (Utah Geological Survey, 2007).

3.17.2 Alternative 1: No Build

Alternative 1 does not improve the ability of the existing I-15 freeway to withstand a seismic event. Surface fault rupture is expected for an earthquake on the Wasatch fault of magnitude 6.5 or greater. A surface fault rupture hazard is not generally a concern for Alternative 1 except where the Wasatch Fault crosses I-15 in Payson.

3.17.3 Alternative 4: I-15 Widening and Reconstruction

The impacts of Alternative 4 on geology and soils and the constraints that these elements have on the project require consideration of earthquake faults, liquefaction, and other geologic considerations. The Preferred Alternative includes Option C at American Fork Main Street and Option D in the Provo/Orem area. Since differences between options in the Provo/Orem area (Options A through D) or in the American Fork Main Street area (Options A, B, and C) are immaterial to geologic and soils impacts or constraints, these options are not discussed separately below.

Surface Fault Rupture

Surface fault rupture is expected for an earthquake on the Wasatch fault of magnitude 6.5 or greater. Surface fault rupture hazard is generally not a concern for the project, except where the Wasatch fault crosses I-15 in Payson.

Liquefaction

The subsurface conditions and seismicity in Utah indicate that liquefaction is a significant hazard in some areas of the state. I-15 traverses zones of liquefaction potential ranging from high to very low. High liquefaction potential suggests that there is a greater than 50% probability of having an earthquake of sufficient magnitude to induce liquefaction of submerged granular soil layers (the probability that the critical acceleration will be exceeded in 100 years). Moderate liquefaction potential suggests that there is a 10-50% chance that the site will experience ground shaking severe enough to cause liquefaction. Low suggests there is a 5 to 10% probability of exceedance, and very low suggests the probability of exceedance is less than 5%. For the project alignment, maps (Anderson et al 1986) identify the liquefaction potential as follows:

Section of Project Alignment	Mapped Liquefaction Potential
Payson to Provo	High (with a Moderate zone in south Payson)
Provo to Orem	Moderate (with a Low zone in north Orem)
Orem to Lehi	High
Lehi to 12300 South	Very Low to Moderate

Other Geologic Considerations

Review of the geologic map by Mulvey (1992) indicates that the project is not underlain by soil or rock that is expansive, collapsible, gypsiferous, or subject to piping. Surficial materials do not consist of limestone or karst (prone to sinkholes), peat (subject to excessive settlement when loaded), or sand dunes (subject to destabilization). Review of the map by Harty (1991) indicates that there have been several deep-seated landslides near the project alignment just south of Point of the Mountain. A deep-seated landslide and two lateral spreads have been mapped near the alignment in Spanish Fork.

3.17.4 Geology and Soils Mitigation

Geotechnical investigations in accordance with UDOT requirements will be conducted as part of the design phase. The design of subsurface, pavement, and structures will be based on the recommendations of the geotechnical engineering analyses. The structures will be designed to meet seismic standards and specifications.

3.18 Construction Impacts

Alternative 1 would have no construction impacts.

Construction of Alternative 4 would have impacts on the manmade environment and the natural environment in the I-15 study area. This section describes how construction could be phased along the 43-mile long corridor, the general construction methodology that would be used, maintenance of traffic, the construction impacts on resources, and mitigation measures to minimize those impacts. There are no identifiable differences in construction impacts among the design options in the Provo/Orem area (Options A, B, C, D) and American Fork Main Street Interchange (Options A, B, C).

As the construction of I-15 will be phased in accordance with availability of funds, the phasing presented in this section is based on the best information available at the time of this analysis. Changes in phasing and the sequencing of construction within any given phase may occur and will likely have different impacts on traffic from that presented in this discussion.

3.18.1 Construction Phasing

UDOT is currently evaluating a construction phasing plan. At this time, no specific construction phasing has been determined and is dependent upon funding availability. However, UDOT anticipates that:

- Preconstruction would proceed after this NEPA process is complete. Preconstruction includes design and right-of-way acquisition.
- Construction may occur in multiple phases, dependent upon funding availability.
- Construction is anticipated to begin in 2011-2012 and is expected to last approximately four to seven years.

3.18.2 Construction Methodology

Reconstruction of I-15 under Alternative 4 would include the construction of the I-15 mainline, reconstruction of interchanges, associated noise barriers, drainage elements, structures, and reconstruction of those portions of cross streets included in the project. It is anticipated that Design-Build will be the project delivery method, similar to the approach used for the reconstruction of I-15 from 10600 South to 600 North in Salt Lake County. The following presents a general overview of information and construction activities that would likely occur in each construction phase.

General Construction Information

It is anticipated that at least two lanes of I-15 traffic, in each direction, would remain open during construction from Bangerter Highway to Spanish Fork. Two lanes would likely remain open from Spanish Fork to South Payson. There would likely be occasional temporary closures of I-15 during critical construction activities. The public would be informed in advance of any closures. Construction is anticipated to occur both night and day and on weekends.

Construction Activities

The following is a list of construction activities that are anticipated for this project.

- Utility relocations. Generally, these would occur when right-of-way has been acquired. Where right-of-way is not required, relocation could occur earlier. Relocation of utilities is typically conducted by utility owner.
- Mobilization and general site preparation. This activity would include clearing and grubbing, removal and storage of topsoil, selective removal of trees and stumps, removal of obstructions, and excavation and removal of existing pavement where required.
- General grading and roadbed preparation. This phase would include most of the earthwork needed to develop a new roadbed and its associated cuts and fills.
- Bridge structures and other structures. These would be constructed in concert with roadwork.
- Storm water management systems construction. This would include construction of storm drain facilities and systems, laterals, cross drains, detention ponds, and other roadway drainage features need to channel and treat highway storm water runoff.
- Construction of temporary pavement sections. Temporary pavement would be placed on portions of the new graded roadbed to enable traffic to continue to use I-15 during construction.
- Construction of the permanent pavement sections. This would include placement and compaction of granular sub-base, base, pavement and surface course. The surface course would be the last paving operation.
- Signing, striping and lighting. Final signing, striping and lighting would occur once the permanent pavement sections are completed.
- Landscaping of the right-of-way. This would generally be one of the last construction activities, except where required for erosion control, weed control, or control of particulate matter.

3.18.3 Construction Impacts Mitigation

Mitigation commitments for environmental impacts from construction are documented in each resource's section. A maintenance of traffic (MOT) plan, emergency services plan, a proactive public information program and a media relations plan will be developed and implemented to keep travelers and businesses advised.

3.19 Cumulative Impacts

3.19.1 Introduction

Cumulative impacts are defined by the CEQ regulations in 40 Code of Federal Regulations (CFR) 1508.7. The CEQ regulations define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time." Cumulative impacts include the direct and indirect impacts of a project together with the reasonably foreseeable future actions of other projects.

3.19.2 Methodology for Determining Cumulative Impacts

The methodology for determining the cumulative impacts of the proposed I-15 project is based on *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997).

This chapter provides a general overview of the methodology used to conduct the cumulative impact analysis. The specific analyses of direct and indirect impacts are provided under the appropriate resource sections in this chapter.

3.19.3 Cumulative Impacts Analysis

3.19.3.1 Cumulative Impact Concerns Identified during Scoping

As part of the I-15 EIS process, scoping meetings were held with the public and resource agencies to help identify issues to be analyzed in the EIS. The comments received during the public and agency scoping period were reviewed to determine if any important issues were identified.

Public Concerns

The public identified primarily concerns about transportation, access, and congestion, based on the public involvement program discussed in Chapter 5 of this DEIS. Some concern was expressed about loss of farmland.

Concerns of Local Municipalities

Meetings were held with local municipalities in the I-15 study area. The main issues identified by community officials included transportation facilities, access, congestion, and specific design options for Alternative 4.

Concerns of Resource Agencies

Several methods were used to solicit potential issues from the resource agencies. First, during the I-15 scoping period, letters were sent to the agencies asking them to identify issues to be studied in the EIS. Second, a resource agency scoping meeting was held on June 5, 2003, to identify potential issues and develop initial methodologies for conducting the cumulative impacts analysis. Third, after the scoping meeting, ongoing coordination with the resource agencies continued to refine issues and EIS methodologies for analyzing cumulative impacts. Over the course of the scoping period, the resource agencies identified the following initial issues:

- Loss of wildlife habitat, including riparian habitat;
- Loss of wetlands; and
- Impacts to regional air and water quality.

3.19.3.2 Important Cumulative Impacts Issues

Based on the scoping process and the potential for direct impacts from the I-15 project, UDOT and FHWA identified the five resources that could be affected by cumulative impacts. Other resources are not expected to be affected by cumulative impacts the five potentially affected resources are

- Wetlands and wildlife habitat;
- Air quality;
- Water quality; and
- Farmland.

3.19.3.3 Urban Growth and Land Use

The potential cumulative impacts on the resources under study depend on future changes in land use in the study area and the direct impacts from the I-15 project. The cumulative impact analysis considered the anticipated changes in land use from regional growth and from direct and secondary (induced) growth caused by the I-15 project. The past and present changes in land use in the I-15 study area are one of the main factors causing the loss of wetlands, wildlife habitat, and farmlands and the degradation of water and air quality.

Timeframe for the Analysis

The timeframe for the cumulative impacts analysis includes two components: the period for which past, known impacts were analyzed and the period for which future predicted impacts were analyzed. The time period for past impact analysis varies by resource depending on the timeframe for which historical data were available. The time period for future impact analysis extends from the present day to the reasonably foreseeable year of 2030.

The time period for the past analysis was determined by the information available for each resource. For some resources, data were available for only the past 10 to 20 years, while for other resources data were available back to early European settlement of the Wasatch Front. In addition, for some resources such as air quality, it was more appropriate to begin the analysis when data were available from monitoring sites rather than at the onset of modern settlement when air quality records were not available. The specific past-year timeframe for each resource analysis is described in each specific resource chapter and is listed below:

- Farmland – 1900 to 2030;
- Air quality – 1975 to 2030;
- Water quality – 1970 to 2030; and
- Wetlands and wildlife habitat – 1850 to 2030.

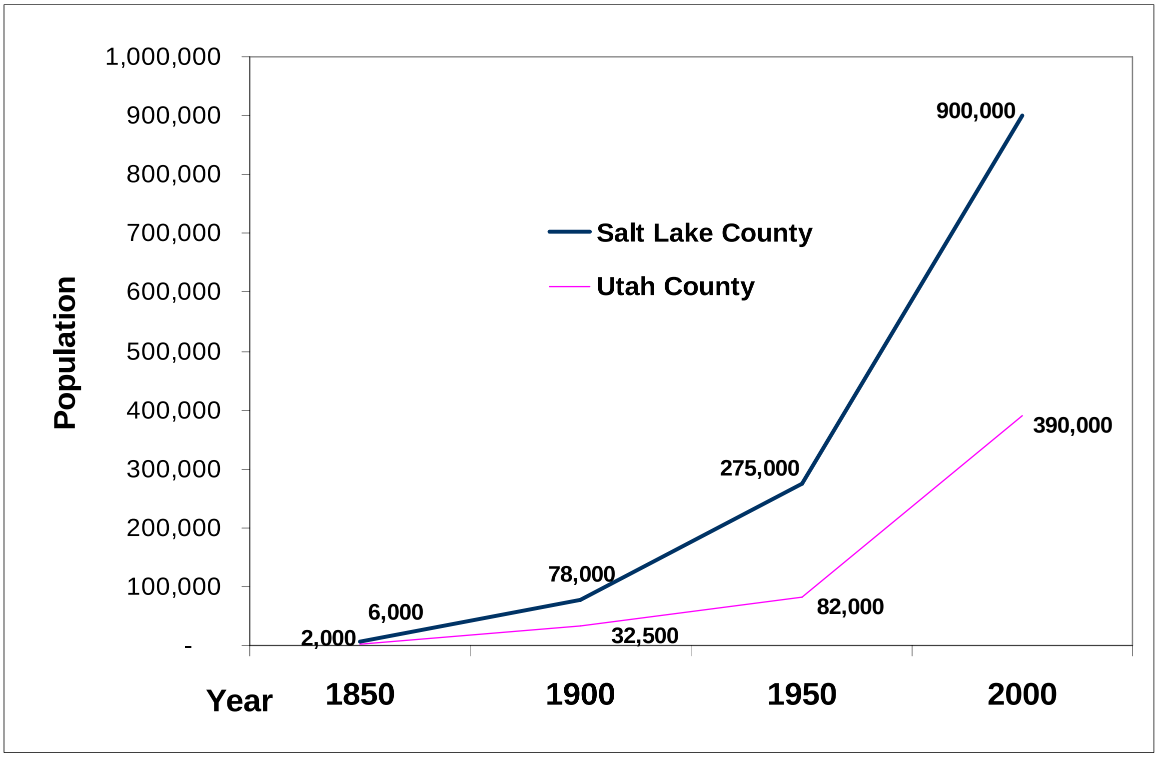
3.19.3.4 Other Actions Affecting the Resources, Ecosystems, and Human Communities of Concern

This section provides a brief overview of the past actions and present and reasonably foreseeable actions that contributed or could contribute to cumulative impacts. Many of the baseline conditions relevant to cumulative impacts are described in detail in each chapter in this EIS.

Past Actions

Utah and Salt Lake counties have experienced major urban expansion resulting in large residential, commercial, and industrial centers along with associated infrastructure such as freeways and surface streets. The 1850 U.S. census found that Salt Lake County had a population of about 6,200 people and Utah County had a population of about 2,000 people. As shown in Figure 3.19-1, the population has increased dramatically since 1850 and this steady increase has led to continuing urban expansion (Utah Governor's Office of Planning and Budget 2000).

Figure 3.19-1: Population Growth in Utah and Salt Lake Counties, 1850 to 2000



The population growth has led to about 30,000 acres being developed for urban uses out of the total 178,500 acres (both developable and undevelopable lands). Utah County has had about 77,000 acres developed out of 1,372,000 acres in the county. Salt Lake County has had about 172,000 acres developed for urban uses out of 489,000 acres in the county. Many of the undeveloped areas consist of undevelopable land such as the Wasatch Mountains and Utah Lake. The urban development has caused the loss of farmland, wetlands, and wildlife habitat. The urban growth has also degraded regional air and water quality. The amount of land available for growth in Utah and Salt Lake counties is limited by the surrounding mountains, the Great Salt Lake, and Utah Lake. Figure 3.19-2 Greater Wasatch Area Developed Land, 2006, provides an overview of developed areas along the Wasatch Front in 2006.

Most growth in Utah County has been suburban. Growth in this area started to occur in the 1980s. Many of the wetlands north of Utah Lake were eliminated with the introduction of farming in the 1900s and, starting in the 1980s, these farmlands along with additional wetlands were affected by urban development north of the lake.

Major past actions in Salt Lake County include the establishment of the Kennecott open-pit mine along the western edge of the Salt Lake Valley in the early 1900s. The establishment of the mine led to a major influx of population between 1900 and 1910, which established small residential areas in Magna and other locations along the western foothills. Though the population steadily grew in the western side of the Salt Lake Valley, it remained largely agricultural until the 1960s.

In the early 1970s, the western side of the Salt Lake Valley in the I-15 study area began to develop rapidly. Major transportation expansion in the I-15 study area occurred in the 1960s with the construction of Interstate 15 (I-15), Interstate 80 (I-80), and State Route (SR) 201. The western portion of Interstate 215 (I-215) was constructed in the 1980s and Bangerter Highway west of I-15 in the 1990s. These transportation projects served the main employment center of Salt Lake City and the supporting suburban areas that developed south, southeast, and north of the city center. The Salt Lake City International Airport was first developed in the 1930s with a major expansion between 1975 and 1980. Major rail freight lines were established in western Salt Lake Valley in the early 1900s to support mining operations.

Present and Reasonably Foreseeable Actions

Several steps were taken to determine potential present and future actions to consider in the cumulative analysis. The first step involved coordinating with the Utah Department of Transportation (UDOT), the Utah Transit Authority, the Wasatch Front Regional Council, and the Mountainland Association of Governments to help identify other transit and roadway projects that could result in cumulative impacts when combined with the I-15 project. This step included reviewing environmental documents that were recently completed or are in progress. In addition, UDOT held multiple meetings with project managers to identify current and upcoming projects and the scope of the potential impacts. The intent of these meetings was to address region-wide issues related to cumulative impacts.

Next, municipalities in the I-15 study area were contacted to help identify major local projects including private developments. Finally, Envision Utah information was gathered concerning potential long-term (2030) growth trends anticipated for the Wasatch Front including the anticipated number of acres of land that will be developed. Figure 3.19-3 shows the amount and type of developed land by 2030. Tables 3.19-1 and 3.19-2 show the major projects identified as other actions to be considered that could affect these resources in the I-15 study area. Figure 3.19-4 and Figure 3.19-5 show the location of transportation projects in both Utah and Salt Lake counties. Figure 3.19-6 shows the general locations of present and reasonably foreseeable development actions.

As noted in Table 3.19-2, about 40,000 additional acres are expected to be developed in the next 30 years in Utah and Salt Lake counties based on current urbanized acres of about 30,000 acres and about 70,000 acres in 2030 if current trends continue (Envision Utah 2003). This developed land includes the proposed future residential and commercial developments and the approximately 250 roadway and transit projects identified in the Wasatch Front Regional Council long-range transportation plan (WFRC 2003), as well as the approximately 120 projects in the Mountainland Association of Governments long-range transportation plan (MAG 2005). Many future development or infrastructure projects are not listed in Tables 3.19-1 and 3.19-2 because they are not yet included in adopted plans. However, these projects are included in the expected 40,000 acres of overall development. Because most of the projects in the long-range transportation plans are in the planning stages, specific impact information could not be obtained.

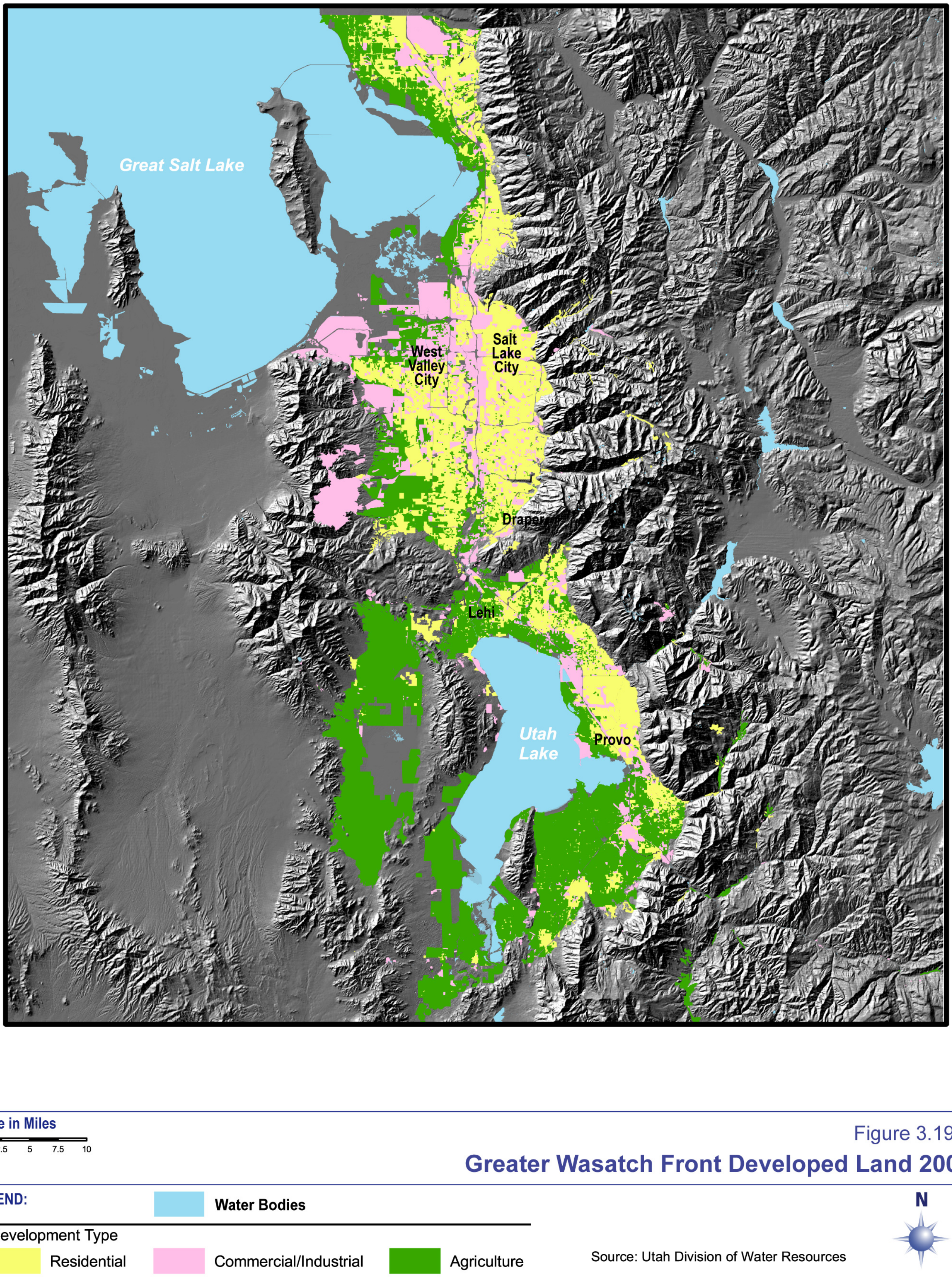
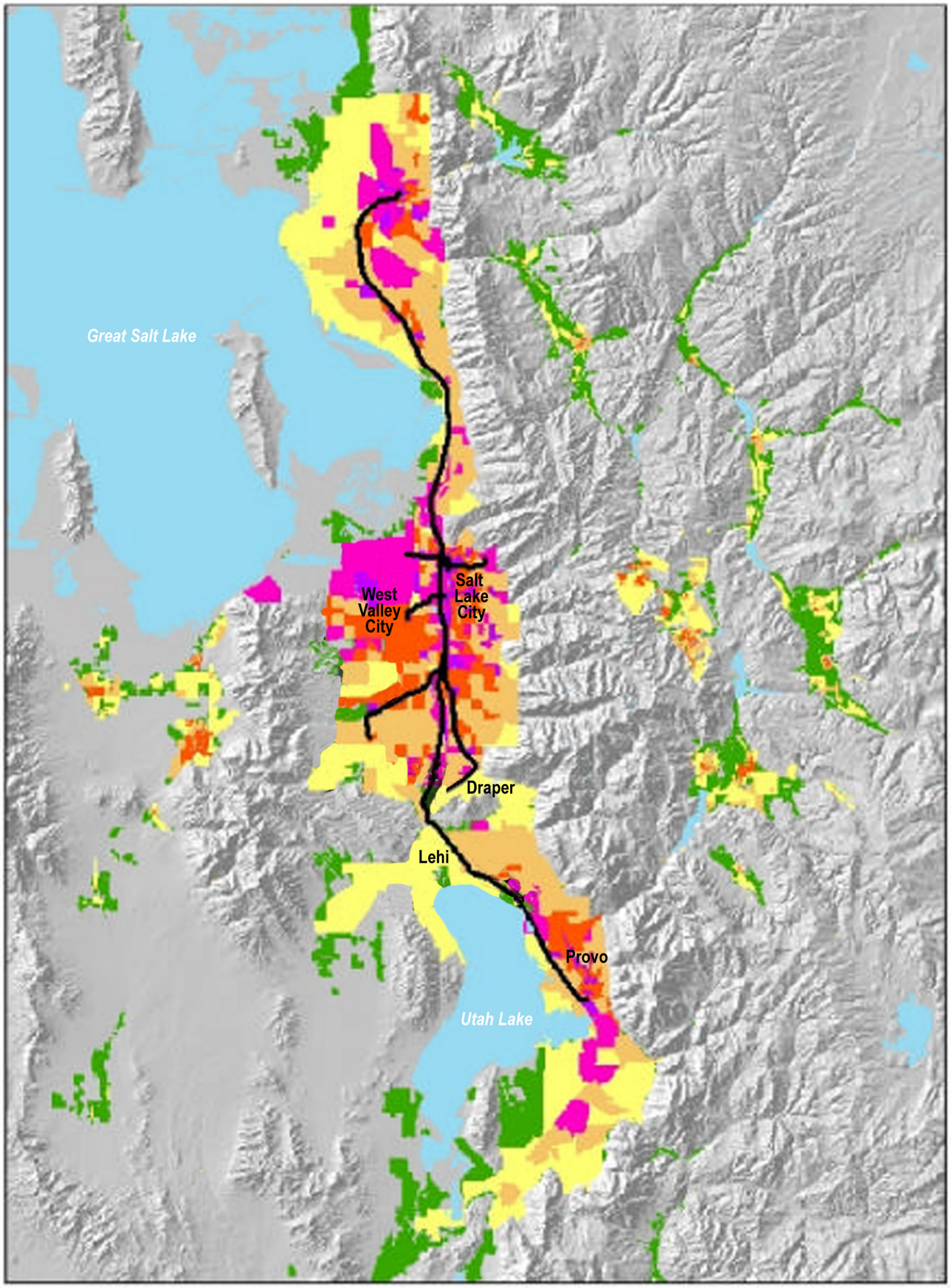


Figure 3.19-2

Greater Wasatch Front Developed Land 2006

Source: Utah Division of Water Resources



Not to Scale

Figure 3.19-3

Greater Wasatch Front Developed Land 2030

LEGEND: **Development Type:**

Residential
- Exurban
- Suburban
- Urban

Commercial
- Dispersed
- Concentrated

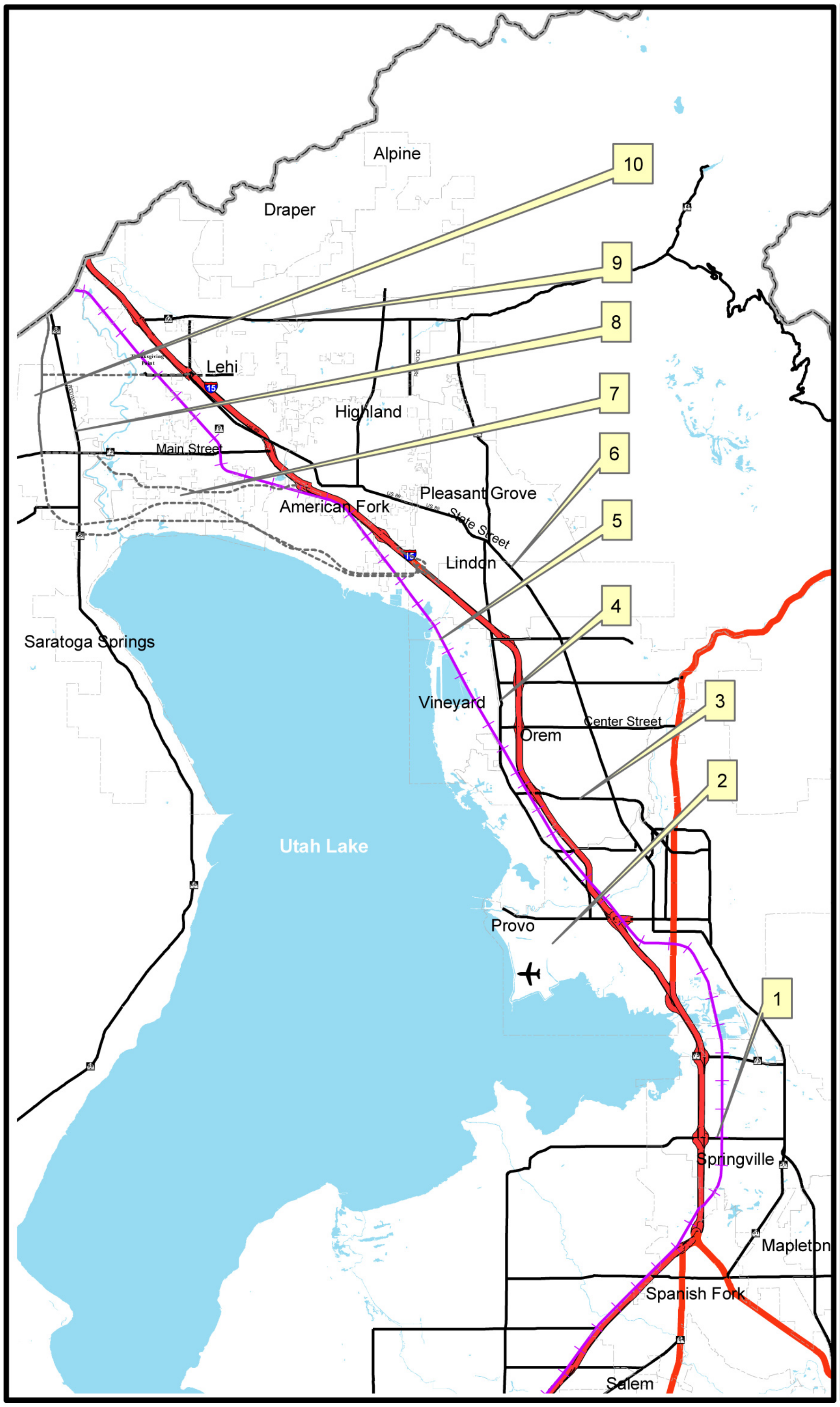
Agricultural

Planned Rail Transit

Water Bodies

N

Source: Governor's Office of Planning and Budget



1 Springville Interchange
2 Airport Road
3 University Parkway BRT
4 Geneva Road
5 Commuter Rail, Salt Lake and Utah Counties
6 State Street
7 North Utah County East-West Connector
8 Redwood Road
9 SR-92
10 Mountain View Corridor

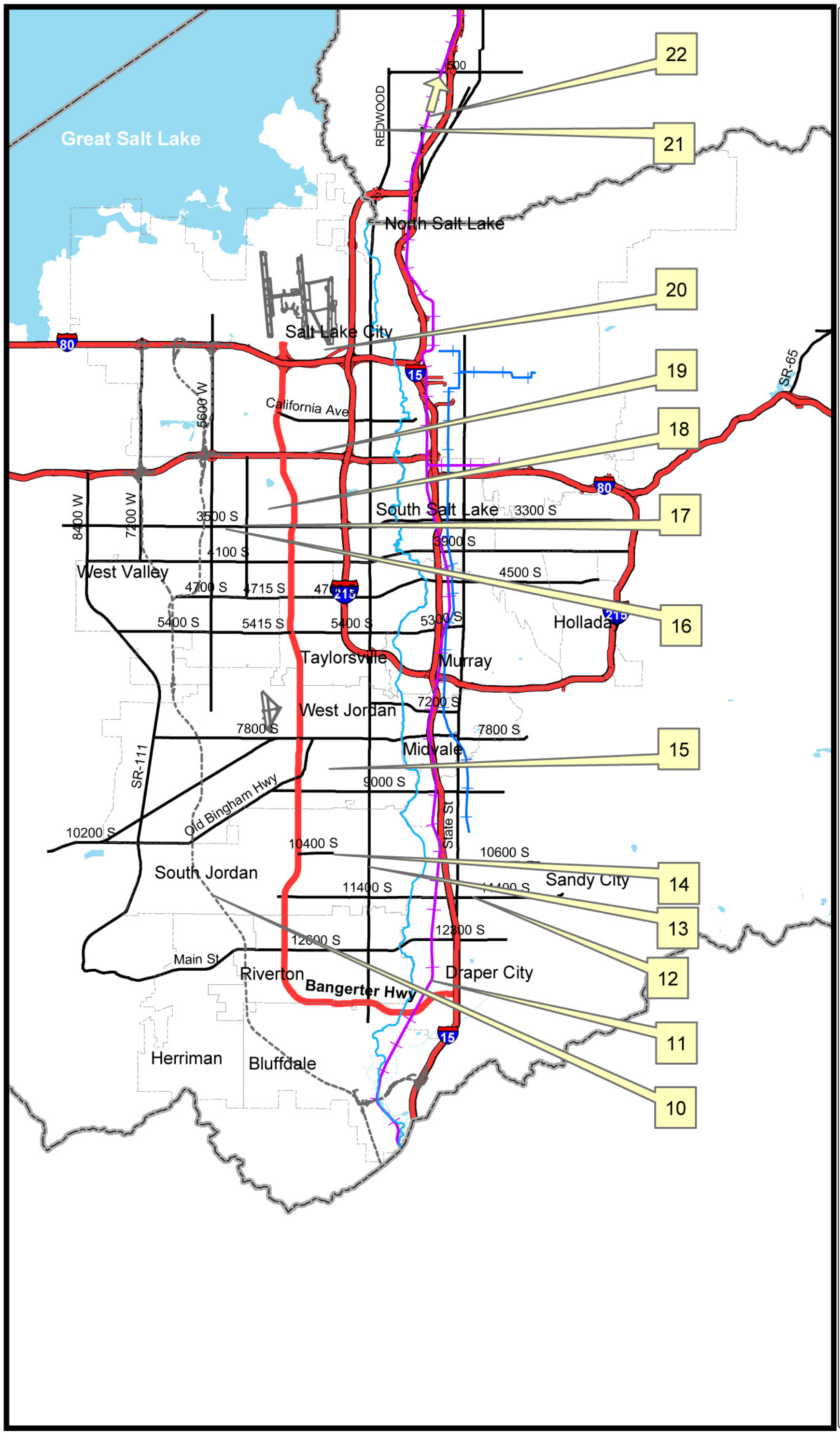
NOT TO SCALE

Figure 3.19-4

Present and Reasonably Foreseeable Transportation Actions - Utah County

LEGEND:

N



10 Mountain View Corridor

11 Draper Light Rail Extension

12 11400th South

13 Redwood Road

14 10400 South

15 West Jordan Light Rail Extension (Mid-Jordan Line)

16 3500 South

17 3500 South BRT

18 West Valley Light Rail Transit Project

19 SR-201

20 Airport to University West-East Light Rail Project

21 Legacy Parkway, Davis and Salt Lake Counties

22 Weber County to Salt Lake City Commuter Rail Project

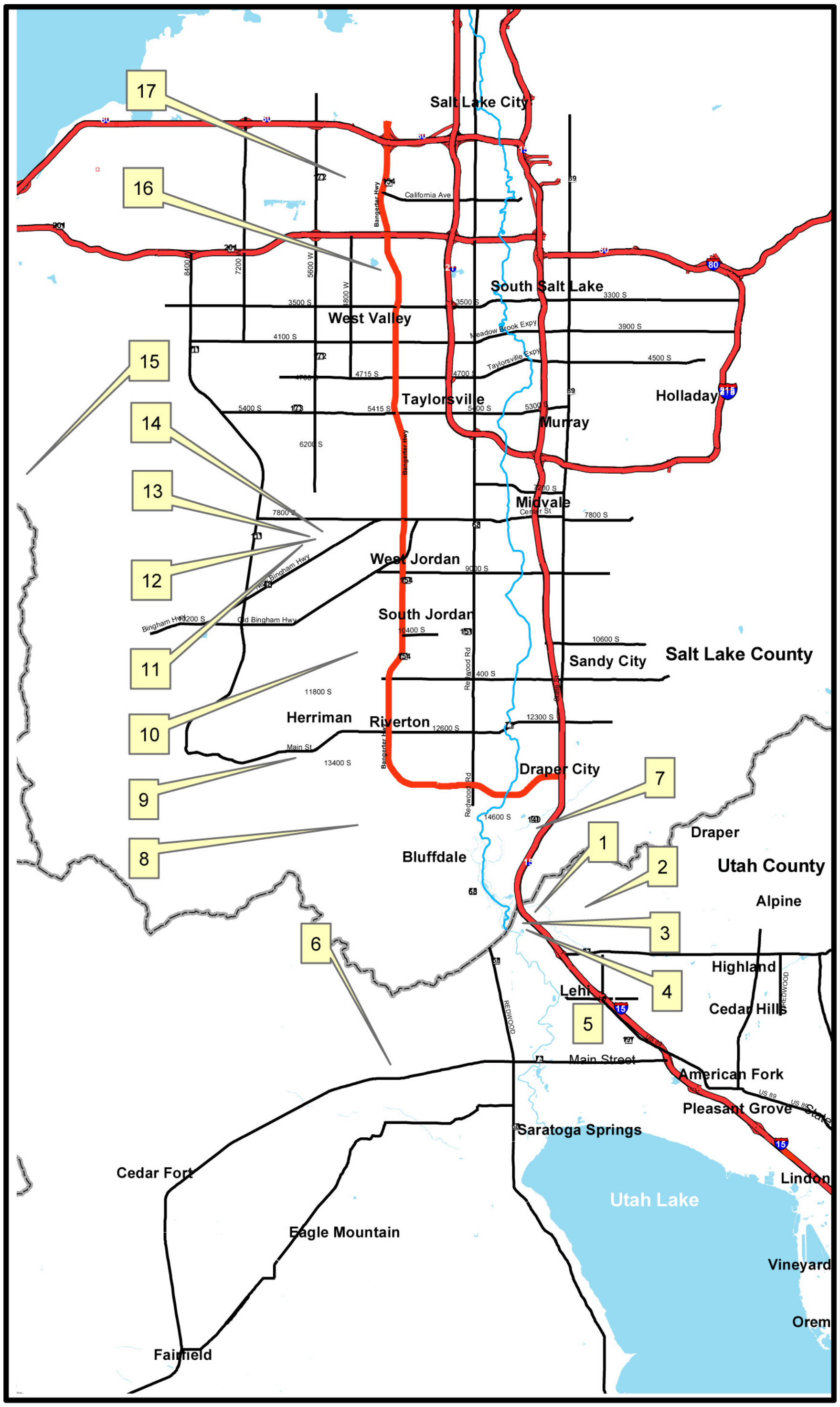
NOT TO SCALE

Figure 3.19-5

Present and Reasonably Foreseeable Transportation Actions - Salt Lake County

LEGEND:

N



1 Frank Gehry Project, Point of the Mountain, Lehi
2 Traverse Mountain, Lehi
3 Thanksgiving Point, Lehi
4 Thanksgiving Meadows, Lehi
5 Various Developments, Lehi
6 Various Developments, Eagle Mountain
7 Independence, Bluffdale
8 Rosecrest, Herriman & Bluffdale
9 Herriman "Downtown", Herriman
10 Daybreak, South Jordan
11 Bloomfield Heights, West Jordan
12 Bloomfield Farms, West Jordan
13 Bloomfield Estates, West Jordan
14 Stone Creek, West Jordan
15 West Bench, Salt Lake County
16 Riverbend, Salt Lake City
17 Suburban Land Reserve, Salt Lake City

Figure 3.19-6

Present and Reasonably Foreseeable Development Actions

LEGEND:

N

Table 3.19-1: Present and Reasonably Foreseeable Transit and Roadway Actions

Project or Activity	Description	Impacts	Project Status
Utah County Projects			
1. Springville Interchange[b]	Improve interchange on SR 77.	Analysis in process; no data available	Planning
2. Airport Road[b]	Build new road from I-15 to Provo Airport or Center Street.	Analysis in process; no data available	Planning
3. University Parkway Bus Rapid Transit	New bus rapid transit on University Parkway.	None expected	Planning
4. Geneva Road[b]	Widen existing Geneva Road from 800 North in Orem to Center Street.	Analysis in process; the impacts below are estimates. ▪ Farmland – 0 to 20 acres ▪ Air Quality – Project conforms to State Implementation Plan ▪ Water Quality – Increase in impervious surface could reduce water quality ▪ Wetlands – 0 to 20 acres ▪ Wildlife Habitat – Some loss of habitat east of Utah Lake ▪ Threatened and Endangered Species – No impacts expected to June sucker, bald eagle, or Ute ladies'-tresses	Planning
5. Commuter Rail, Salt Lake and Utah Counties	Evaluation of commuter rail in Salt Lake and Utah Counties.	Analysis in process; no data available	Planning
6. State Street[b]	Improve intersections and widen State Street from 2000 North in Orem to 100 East in American Fork.	Analysis in process; no data available	Planning
7. North Utah County East-West Connector[b]	Build new road north of Utah Lake from Redwood Road to I-15.	Analysis in process; the impacts below are estimates. ▪ Farmland – 20 acres to 70 acres ▪ Air Quality – Project conforms to State Implementation Plan ▪ Water Quality – Increase in impervious surface could reduce water quality ▪ Wetlands – 10 acres to 40 acres ▪ Wildlife Habitat – Some loss of habitat ▪ Threatened and Endangered Species – None	Planning

Table 3.19-1: Present and Reasonably Foreseeable Transit and Roadway Actions - continued

Project or Activity	Description	Impacts	Project Status
Utah County Projects - continued			
8. Redwood Road (SR 68)[a, b] (UDOT 2007)	Widen Redwood Road from Bangerter Highway to the southern limits of Saratoga Springs.	▪ Farmland – 20.5 acres ▪ Air Quality – Project conforms to State Implementation Plan ▪ Water Quality – None ▪ Wetlands – 0.03 acre ▪ Wildlife Habitat – None ▪ Threatened and Endangered Species – None	Planning
9. SR 92[b]	Widen existing road from I-15 to SR 146.	Analysis in process; the impacts below are estimates. ▪ Farmland – None ▪ Air Quality – Project conforms to State Implementation Plan ▪ Water Quality – Increase in impervious surface could reduce water quality ▪ Wetlands – 0 to 1 acre ▪ Wildlife Habitat – Loss of 1 acre to 2 acres of habitat ▪ Threatened and Endangered Species – None	Planning
10. Vineyard Connector	Proposed new roadway from Orem to American Fork Main Street	Minor environmental impacts expected	Planning
11. Mountain View Corridor, Utah and Salt Lake Counties	New freeway from I-80 in Salt Lake County to Lehi in Utah County	*Impacts below are only for Utah County:* ▪ Prime farmland – 184 to 210 acres ▪ Agriculture Protection Areas – 0 to 6 ▪ Relocations – 32 to 127 ▪ Potential Relocations – 0 to 9 ▪ Recreation areas 2 to 3 ▪ Community Facilities – 0 to 1 ▪ Existing Trails –1 to 4 ▪ Proposed Trails – 6 to 20 ▪ Noise receptors above criteria – 134 to 226 ▪ Stream/canal crossings – 1 to 4 ▪ Wetlands – 14.74 to 78.32 acres ▪ Threatened and Endangered Species habitat – 0 to 1 ▪ Cultural Resources (adverse impacts) – 2 to 7 ▪ Hazardous Waste Sites – 2 to 6	EIS, Fall 2007

Table 3.19-1: Present and Reasonably Foreseeable Transit and Roadway Actions - continued

Project or Activity	Description	Impacts	Project Status
Salt Lake County Projects			
12. Draper Light-Rail Extension	Extension of existing north-south light rail to Draper.	Analysis in process; no data available	Planning
13. 11400 South[a, b] (FHWA 2005a)	Improve transportation system around 11400 South from Bangerter Highway to 700 East.	▪ Farmland – None ▪ Air Quality – Conforms to State Implementation Plan ▪ Water Quality – No impairment of the Jordan River or its tributaries ▪ Wetlands – 0.57 acres ▪ Wildlife Habitat – Between 0.33 acres and 3.54 acres of wildlife habitat affected, some near the Jordan River ▪ Threatened and Endangered Species – Minor changes to habitat for the common yellowthroat	Planning
14. Redwood Road[a, b] (UDOT 2005)	Widen Redwood Road from two to five lanes from 10400 South to Bangerter Highway.	▪ Farmland – None ▪ Air Quality – Conforms to State Implementation Plan ▪ Water Quality – No impairment of the Jordan River or its tributaries ▪ Wetlands – None ▪ Wildlife Habitat – Minor changes ▪ Threatened and Endangered Species – None	Construction
15. 10400 South[a, b] (FHWA 2003)	Widen 10400 South from Bangerter Highway to Redwood Road.	▪ Farmland – None ▪ Air Quality – Conforms to State Implementation Plan ▪ Water Quality – Improvements from implementation of storm drainage system ▪ Wetlands – None ▪ Wildlife Habitat – None ▪ Threatened and Endangered Species – None	Planning

Table 3.19-1: Present and Reasonably Foreseeable Transit and Roadway Actions - continued

Project or Activity	Description	Impacts	Project Status
Salt Lake County Projects - continued			
16. West Jordan Light-Rail Extension (Mid-Jordan Line), Salt Lake County[a] (Utah Transit Authority 2005b)	New light-rail line from the 6400 West light-rail station to South Jordan.	▪ Farmland – None ▪ Air Quality – Conforms to State Implementation Plan ▪ Water Quality – No increase in overall pollutant levels ▪ Wetlands – 0.32 acres ▪ Wildlife Habitat – 173 acres of previously disturbed habitat ▪ Threatened and Endangered Species – None	Planning
17. 3500 South, Salt Lake County[a, b] (UDOT 2006)	Widen 3500 South from Redwood Road to Bangerter Highway.	▪ Farmland – None ▪ Air Quality – Conforms to State Implementation Plan ▪ Water Quality – No increase in overall pollutant levels ▪ Wetlands – None ▪ Wildlife Habitat – None ▪ Threatened and Endangered Species – None	Planning
18. 3500 South Bus Rapid Transit	New bus rapid transit on 3500 South.	None expected	Planning
19. West Valley Light-Rail Transit Project, Salt Lake County[a] (Utah Transit Authority 2007)	New light-rail line from the 2100 South light-rail station to the West Valley City Center.	▪ Farmland – None ▪ Air Quality – None ▪ Water Quality – No increase in overall pollutant levels ▪ Wetlands – 0.72 acre ▪ Wildlife Habitat – 15.28 acres ▪ Threatened and Endangered Species – None	Planning
20. SR 201[a, b] (UDOT 2003)	Widening of and safety improvements on SR 201 from the Jordan River to 5600 West.	▪ Farmland – None ▪ Air Quality – Conforms to State Implementation Plan ▪ Water Quality – Improvements to water quality from stormwater system ▪ Wetlands – 3.7 acres ▪ Wildlife Habitat – Minor changes ▪ Threatened and Endangered Species – None	Under construction

Table 3.19-1: Present and Reasonably Foreseeable Transit and Roadway Actions - continued

Project or Activity	Description	Impacts	Project Status
Salt Lake County Projects - continued			
21. Airport to University West-East Light Rail Project, Salt Lake County[a] (Utah Transit Authority 1999)	Light rail from Salt Lake City to the Salt Lake City International Airport.	▪ Farmland – None ▪ Air Quality – Conforms to State Implementation Plan ▪ Water Quality – No increase in overall pollutant levels ▪ Wetlands – 4.89 acres ▪ Wildlife Habitat – No substantial changes ▪ Threatened and Endangered Species – None	Planning
22. Legacy Parkway, Davis and Salt Lake Counties[a] (FHWA 2005b)	Fourteen-mile, four-lane highway in Salt Lake and Davis Counties from I-15/US 89 to I-215.	▪ Farmland – 29 acres ▪ Air Quality –Conforms to State Implementation Plan ▪ Water Quality – No increase in overall pollutant levels ▪ Wetlands – 113 acres ▪ Wildlife Habitat – 700 acres ▪ Threatened and Endangered Species – Potential noise disturbance to bald eagle from construction	Construction
23. Weber County to Salt Lake City Commuter Rail Project[a, b] (Utah Transit Authority 2005a)	Commuter rail on existing tracks from Pleasant View in Weber County to Salt Lake City in Salt Lake County. New station locations.	▪ Farmland – 6.41 acres of direct impacts; 39.2 acres of indirect impacts ▪ Air Quality – Conforms to State Implementation Plan ▪ Water Quality – No increase in overall pollutant levels ▪ Wetlands – 19.3 acres ▪ Wildlife Habitat – No substantial changes ▪ Threatened and Endangered Species – None	Construction

[a] Data from most recent environmental document; see reference.
[b] Included in UDOT 2007 Statewide Transportation Improvement Program.

Table 3.19-2: Present and Reasonably Foreseeable Development Actions

Project or Activity	Description	Impacts	Project Status
Utah County	The area is developing quickly with traditional urban land uses (housing, commercial, retail, infrastructure, and institutional uses) through the 2030 planning period. The urbanized area is expected to increase from 30,500 acres in 2000 to about 70,000 acres in 2030. Development includes land developed as part of future roadway and transit projects identified in the long-range transportation plans. Large developments are listed below.	Loss of open space, farmland, wildlife habitat, and wetlands. Increase in air emissions, stormwater runoff, and noise.	Current and future land development projects are expected to the year 2030. Some projects are currently being developed, and others are in the preliminary planning stages. Some of the 70,000 acres of development include anticipated urban growth based on population projections.
Frank Gehry Point of the Mountain, Lehi (2,500 housing units)			
Traverse Mountain, Lehi (8,000 housing units)			
Thanksgiving Point, Lehi (328 housing units)			
Thanksgiving Meadows, Lehi (327housing units)			
Various Developments, Lehi (1,270 housing units)			
Various Developments, Eagle Mountain(25,390 housing units)			
Salt Lake County			
Independence, Bluffdale (3,600 housing units)			
Rosecrest, Herriman and Bluffdale (5,500 housing units)			
Herriman Downtown, Herriman (350-acre site, number of housing units not identified)			
Daybreak, South Jordan (20,785 housing units)			
Bloomfield Heights, West Jordan (106 units)			
Bloomfield Farms, West Jordan (80 units)			
Bloomfield Estates, West Jordan (160 housing units)			
Stone Creek, West Jordan (965 housing units)			
West Bench, Salt Lake County (200,000 housing units)			
Riverbend, Salt Lake City (2,000 housing units)			
Suburban Land Reserve, Salt Lake City (Number of units not identified; in planning process)			

In 2003, the Utah Governor's Office of Planning and Budget outlined projected growth that is expected along the greater Wasatch Front. As shown in Figure 3.19-3, Greater Wasatch Area Developed Land, 2030, much of the area that was undeveloped or agricultural in 2006, as represented in Figure 3.19-2, is expected to develop by 2030 based on current population growth rates. Most of the agricultural land in the I-15 study area is expected to be converted to urban development. Note that the Office of Planning and Budget uses different land-use classifications than those shown in Figure 3.19-2, which was prepared by the Utah Division of Water Rights.

3.19.4 Cumulative Impacts Analysis by Resource

Cumulative impacts were analyzed in accordance with CEQ guidance (CEQ 1997). This chapter provides the foundation for determining the important issues to be evaluated as well as the past, present, and reasonably foreseeable projects to be considered in the analysis. Detailed information about the affected environment and direct impacts from the I-15 is provided in the following sections of this chapter:

- Section 3.5, Farmlands
- Section 3.8, Air Quality
- Section 3.12, Water Resources
- Section 3.14, Wetlands/Waters of the U.S.
- Section 3.15, Wildlife, Threatened and Endangered Species
- Section 3.16, Cultural Resources

The following sections discuss the cumulative impacts that may affect certain resources in the I-15 project corridor study area.

3.19.4.1 Farmlands

The potential cumulative impacts on the resources under study depend on future changes in land use. For the farmland cumulative impact analysis, the geographic scope is Utah and Salt Lake counties. This area was selected based on the availability of data and because it is the likely area of development surrounding the I-15 project. The total timeframe of the farmland cumulative impact analysis is about 1900 through 2030. The baseline for the farmland cumulative analysis is 2002, the year for which the most recent data were available from the Utah Division of Water Resources' Land Survey.

Past Trends

Although data on the amount of farmland available in the period between 1900 and the 1960s were not available for Salt Lake and Utah Counties, vast areas of each county were farmed to supply the local population. In 1960, although the eastern areas of the two counties had been developed, the western valleys remained largely agricultural. In 1960, the Lower Jordan River Basin (which includes all of Salt Lake County) had about 93,000 acres of agricultural land. Between 1960 and 1994, the amount of agricultural land in this area declined to 43,800 acres. By 2002, the Utah Division of Water Resources' Land Survey noted only about 28,099 acres of agricultural land.

In 1966, in the Upper Jordan River Study Area (which includes Utah County and portions of the surrounding counties), there were about 172,700 acres of irrigated cropland. By 1995, the amount of irrigated cropland increased to 174,300 acres. However, the Utah Division of Water Resources' Land Survey did cite a decline in the total amount of land available for agriculture in Utah County from 211,259 acres in 1995 to 168,376 acres in 2002.

Future Trends

No data are available on the exact amount of agricultural land that will be converted to urban uses in the two counties. However, a comparison between Figure 3.19-2 Greater Wasatch Area Developed Land 2006, and Figure 3.19-3 Greater Wasatch Area Developed Land 2030, regional development would likely result in a greater-than-50%

loss of agricultural land. If loss of agricultural land in Utah and Salt Lake Counties is greater than 50%, there could be an overall reduction in agricultural land of about 100,000 acres.

I-15 Project Impacts

Alternative 4 would result in a direct loss of about 79 acres or less of agricultural land. Other planned transportation projects listed in Table 3.19-1 would result in about 2100 acres of additional impacts to agricultural land. These projects would potentially increase impervious surface area, and could impact wildlife that use farmland as habitat. However, the main contributor will continue to be urban growth that will occur between 2002 and 2030 in the two counties. This growth and development will occur with or without the I-15 project. No data are available on the exact amount of agricultural land that will be converted to urban uses in the two counties but it is expected that there will be a greater-than-50% loss of agricultural land, or about 100,000 acres. Overall, due to the planned conversion of existing agricultural land to residential or commercial uses in the next 30 years, the cumulative impact on agricultural land is expected to be near a 50% loss of agricultural land. Overall, the I-15 project would contribute to less than 0.0001% of the total loss in farmland.

Mitigation

Section 3.5, Farmlands, provides a detailed discussion of farmland mitigation measures. The mitigation measures include the following:

Owners of farmland and farm-related businesses within the I-15 right-of-way will be compensated according to the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and other state and federal guidelines if the owners' properties are affected by project construction.

3.19.4.2 Air Quality

For the air quality cumulative impact analysis, the geographic scope is Utah and Salt Lake counties. This area was selected based on the availability of data and because it would be directly affected by the I-15 project. The total timeframe for the air quality cumulative impact analysis is about 1990 through 2030. The baseline for the air quality cumulative analysis is 2005, using data from the Utah Division of Air Quality's Annual Report for 2005 (Utah Division of Air Quality 2006).

Past Trends

Overall air quality in Utah and Salt Lake counties has been improving. In the past 25 years, Utah has made enormous progress in improving air quality. In the early 1980s, the health standards for four of the six criteria pollutants (carbon monoxide [CO], ozone, particulate matter, and sulfur dioxide, but not lead or nitrogen dioxide) identified by EPA were violated in one or more Utah counties. Currently, two of the six criteria pollutants identified by EPA, ozone and particulate matter (PM_{10}), occasionally reach levels that can affect the health and well-being of Utah's urban residents who are more sensitive to pollution, such as children, the elderly, and those with chronic health problems. These pollutants can aggravate respiratory disorders during periods of high pollution and lead to chronic illness (Utah Division of Air Quality 2006).

Historically, Utah had problems meeting the National Ambient Air Quality Standard for CO; however, it has been many years since violations occurred. In March 2004, a request was submitted to EPA to redesignate Provo as an attainment area for CO along with the associated maintenance plan. This request was approved in December 2005 and became effective on January 3, 2006. The plan demonstrated that there was no longer a need for oxygenated fuels and revised the transportation conformity budget to be consistent with EPA's latest mobile emissions model, MOBILE6. All areas with historic CO problems are now designated as maintenance areas for CO. The charts below show the historic air quality trends for five of the six criteria pollutants along the Wasatch Front (Utah Division of Air Quality 2006).

Figure 3.19-7: CO Second-Highest 8-Hour Concentration

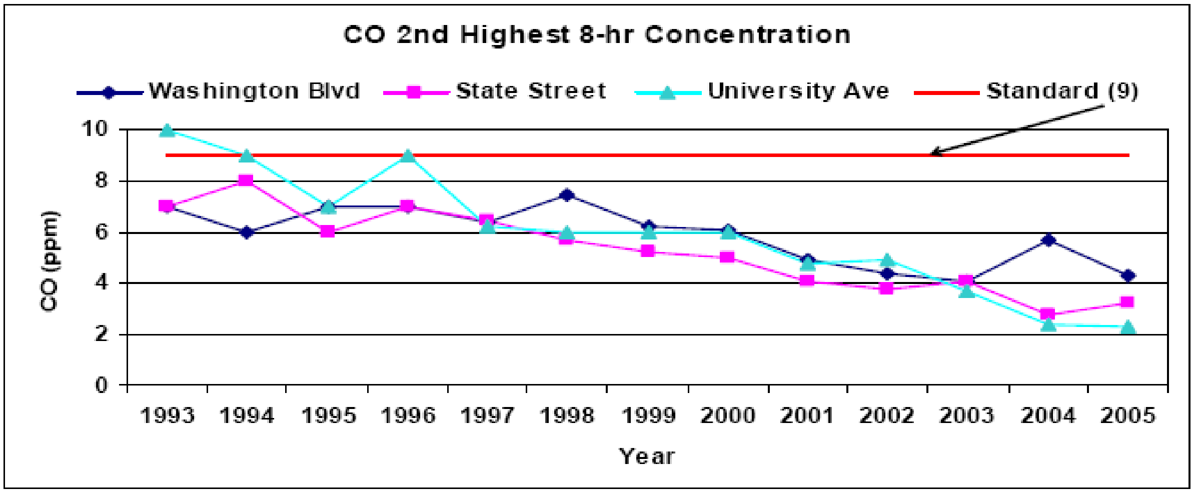


Figure 3.19-8: Nitrogen Dioxide Annual Averages

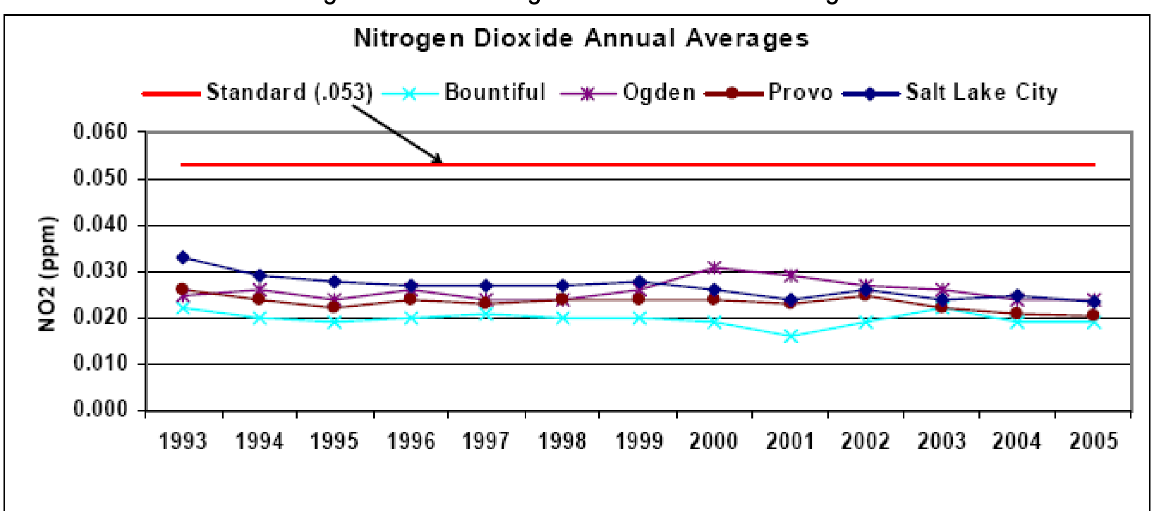


Figure 3.19-9: Three-Year Average Fourth-Highest 8-Hour Ozone Concentration

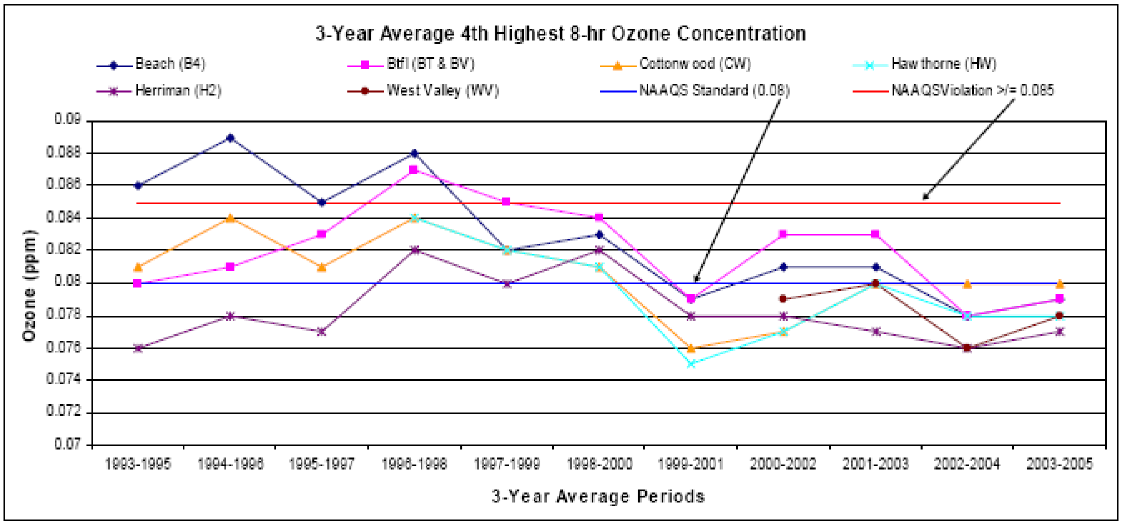


Figure 3.19-10: PM_{10} Annual Mean Concentration

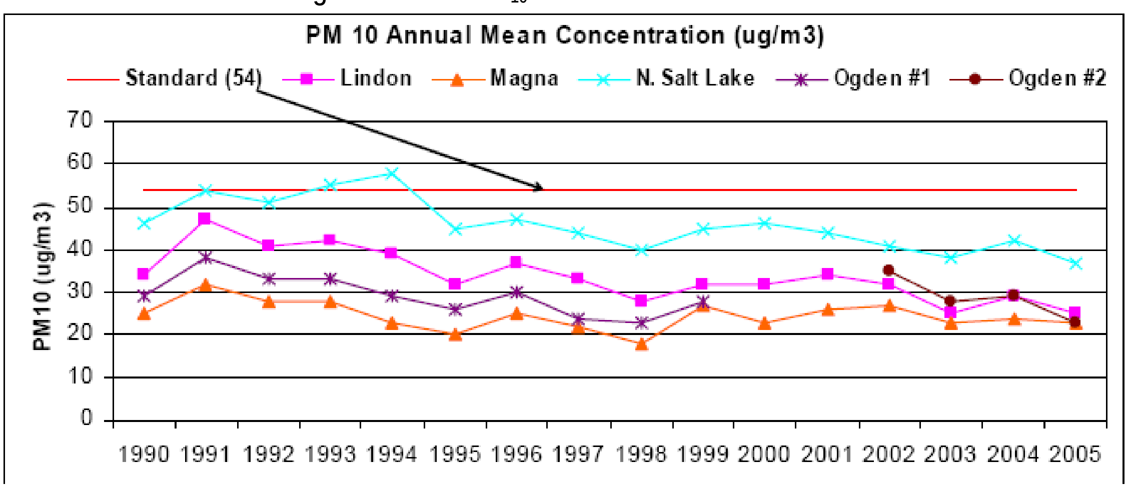
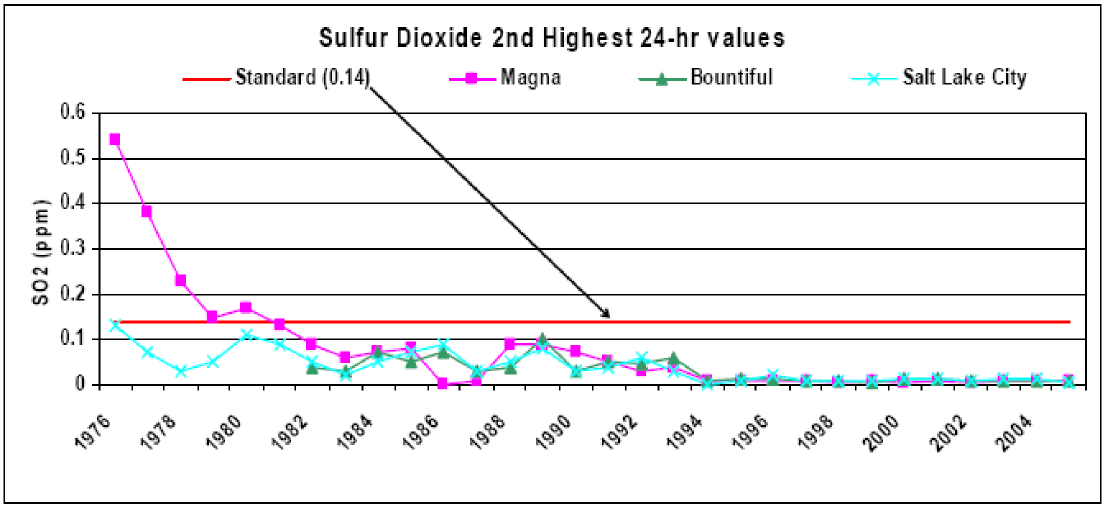


Figure 3.19-11: Sulfur Dioxide Second-Highest 24-Hour Values



No charts were available for lead; however, Utah has not exceeded the health standard for lead since the late 1970s (Utah Division of Air Quality 2006).

Future Trends

With improvements to vehicle emissions and more stringent air quality controls, it is expected that air quality will continue to improve along the Wasatch Front through the 2030 planning period.

I-15 Project Impacts

Regional modeling conducted by the Wasatch Front Regional Council and the Mountainland Association of Governments for the 2030 transportation conformity analyses demonstrated that all regionally significant transportation projects (including the I-15 project) would be in compliance with the National Ambient Air Quality Standards. Population growth in the air quality impact analysis area has had little effect on overall air quality as demonstrated by the continuing improvement in air quality throughout the region. Air pollutant emissions from the I-15 alternatives would increase slightly due to the increase in vehicle-miles traveled because of improved mobility.

Overall, the growth in the area by 2030 would likely be the same with or without the I-15 project. However, the project would help reduce regional traffic congestion and improve travel times, which could help maintain compliance with air quality standards. Improved travel times throughout the region would reduce idling emissions of CO and volatile organic compounds.

Fugitive Dust

During construction of the project and other developments in the I-15 study area, fugitive-dust-control measures would be needed in certain areas to protect disturbed soils from wind erosion until permanent, stabilized cover is established. After the construction phase is completed, the soil would have a lower potential for wind erosion compared to its undisturbed state.

Vehicle Emissions

Vehicle emissions have continued to decrease substantially over time as EPA has imposed a series of tighter emission-control requirements on engine emissions. As the region's vehicle fleet becomes newer and the older, high-emitting vehicles are replaced, it is expected that the tighter emission standards will substantially offset the regional growth in vehicle-miles traveled. Although it is difficult to predict fleet-average emissions for 2030, it is expected that the more stringent federal regulation of motor vehicle emissions will continue to drive vehicle emissions even lower, thus helping to offset the growth in vehicle-miles traveled.

Mobile-Source Air Toxics (MSATs)

Section 3.8 Air Quality in this chapter contains more detailed information on MSATs. Most air toxics originate from human-made sources including on-road mobile sources, non-road mobile sources (such as airplanes), area sources (such as dry cleaners), and stationary sources (such as factories or refineries). MSATs are a subset of the 188 air toxics defined by the Clean Air Act. MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

EPA is the lead federal agency for administering the Clean Air Act and has specific responsibilities for determining the health effects of MSATs. On March 29, 2001, EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources (66 Federal Register 17229). In its rule, EPA examined the impacts of existing and newly promulgated mobile-source control programs, including its reformulated gasoline program, its national low-emission vehicle standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur-control requirements, and its proposed heavy-duty engine and vehicle standards and on-highway diesel fuel sulfur-control requirements. Between 2000 and 2020, the Federal Highway Administration (FHWA) projects that, even with a 64% increase in vehicle-miles traveled, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 67% to 76% and will reduce on-highway diesel particulate emissions by 90%.

In February 2007, EPA issued a final rule to reduce hazardous air pollutants from mobile sources. The final standards will lower emissions of benzene and other air toxics in three ways: (1) by lowering the benzene content in gasoline, (2) by reducing exhaust emissions from passenger vehicles operated at cold temperatures under 75 degrees Fahrenheit, and (3) by reducing emissions that evaporate from, and permeate through, portable fuel containers.

Under this rule, EPA expects that new fuel benzene and hydrocarbon standards for vehicles and gas cans will reduce total emissions of mobile-source air toxics by 330,000 tons in 2030, including 61,000 tons of benzene. As a result, new passenger vehicles will emit 45% less benzene, gas cans will emit 78% less benzene, and gasoline will have 38% less benzene overall.

$PM_{2.5}$

On March 29, 2007, EPA issued a rule defining requirements for state plans to clean the air in areas with levels of fine particle pollution ($PM_{2.5}$) that do not meet national air quality standards. It is anticipated that portions of Salt Lake and Utah Counties will be designated as non-attainment areas under the revised $PM_{2.5}$ standard (35 $\mu g/m^3$, or micrograms per cubic meter). Non-attainment designations under the revised standard will be in place by the end of 2008, and conformity to the new standard will be required in 2010.

By 2012, Utah will be required to submit a new section to the State Implementation Plan documenting how the State will meet the revised $PM_{2.5}$ standard. Once the $PM_{2.5}$ State Implementation Plan is approved by EPA, WFRC and MAG will be required to make a conformity determination verifying that transportation-related emissions are within the limits established in the Plan. During the interim period from 2010 to 2012 when $PM_{2.5}$ conformity is required to 2013 when emission limits are established in the Plan, WFRC and MAG will be required to establish conformity by demonstrating that future $PM_{2.5}$ emissions are lower than 2005 levels.

Mitigation

FHWA and UDOT conclude that the proposed I-15 project would not have a substantial impact on regional air quality, so no mitigation measures are proposed for direct impacts from use of the I-15 project. Potential construction-related air quality mitigation measures are described in Section 3.18 of this chapter and include development of a Fugitive Dust Emission Control Plan, street sweeping, and maintaining equipment to reduce emissions.

3.19.4.3 Water Quality

This section provides an overview of the cumulative impacts to water quality from the I-15 project and other actions in the area. The geographic scope of this analysis includes the Utah Lake–Jordan River Watershed Management Unit which lies in north-central Utah and includes those streams that drain into Utah Lake and the Jordan River and its tributaries from Utah Lake to the Great Salt Lake. The timeframe of the water quality cumulative impact analysis is about the mid-1970s through 2030. The mid-1970s were selected as the early date for the analysis based on the availability of data. The baseline year selected for the analysis is 2005 based on the availability of 2005 water quality data.

Past Conditions

The rivers and lakes in the Utah Lake–Jordan River Watershed Management Unit have been extensively altered as a result of urban and agricultural development during the past century. Many of the streams that flowed into Utah Lake, the Jordan River, and the Great Salt Lake have been altered for water supplies, control of stormwater, agricultural uses, and urban development. For example, the Jordan River has been altered to reduce its potential for flooding and to allow for urban and agricultural development. As development occurred in the area, the amount of impervious surfaces, sewage-treatment plants, and agricultural areas increased, all of which reduced water quality through the early 1970s.

The decrease in water quality was analyzed in the Utah Lake–Jordan River Watershed Management Unit Stream Assessment (Utah Division of Water Resources 2002). This report estimated that there are 1,314 perennial stream-miles in the Utah Lake–Jordan River Watershed Management Unit, of which 1,025 miles (78.0%) were assessed for support of their designated beneficial uses. Of these 1,025 miles, 848.5 miles (82.7%) were determined to fully support all their beneficial uses, 108.3 miles (10.6%) were determined to partially support their beneficial uses, and 68.4 miles (6.7%) were determined to not support at least one designated beneficial use. The streams that do not support their beneficial use are considered impaired waters.

The major causes of impairment (rivers that don’t support their beneficial use) were metals, habitat alterations, flow alterations, and pH. The major sources of impairment were resource extraction, habitat modification, hydromodification, and agricultural activities. Table 3.19-3 below lists the sources of water quality impairment for streams in the Utah Lake–Jordan River Watershed Management Unit.

Table 3.19-3: Sources of Water Quality Impairment in the Utah Lake – Jordan River Management Unit, 2002

Source	Contribution to Impairment
Resource extraction	19.4%
Unknown	18.1%
Habitat modification	16.7%
Agricultural	14.7%
Hydromodification	14.7%
Urban runoff	6.2%
Industrial point sources	4%
Municipal point sources	4%
Natural sources	2.1%

Source: Utah Division of Water Quality 2002

Within the past several decades, a number of regulatory programs have evolved that control stormwater and restrict direct disturbances of water bodies. The 1987 revisions to the Clean Water Act placed new emphasis on the requirement for cities and counties to obtain permits for stormwater discharges and to mitigate impacts. In addition, the State of Utah requires approval for any project that proposes to disturb any area within the ordinary high-water mark of a stream or lake and controls the amount of disturbance to the water body and requires restoration for any impacts. USACE also regulates impacts to wetlands and navigable waters of the U.S.

The above regulatory controls have resulted in improved water quality in the Jordan River, which is the main water body within the I-15 study area. The quality of water has improved since the passage of the 1972 Clean Water Act. Regulations on municipal waste from wastewater treatment plants, stormwater runoff, and industrial discharges have reduced concentrations of pollutants discharged into the Jordan River (Hooton 1999). In addition, the Jordan River Water Quality Total Maximum Daily Load Assessment (Utah Division of Water Quality 2005) noted that the water quality of the Jordan River has generally improved since implementation of a Section 208 Water Quality Plan in 1975.

Future Trends

The regulatory programs briefly summarized above assure that the rate of hydrologic and water quality degradation in developing areas will be greatly reduced from those that historically occurred. However, the future water resource conditions in the water quality cumulative impact analysis area are difficult to predict accurately. For example, as urban development in the area continues, the amount of impervious surfaces will increase, but other pollutant sources from agriculture and resource extraction will decrease (as these lands will be converted to urban uses), thus making an overall assessment of future water quality conditions difficult. Stormwater regulations could continue to evolve, resulting in new rules such as such as stricter controls from construction sites and new urban development.

I-15 Project Impacts

Alternative 4 would increase the amount of impervious surface from the existing 730 acres to a maximum of 1290 acres, which would increase the potential for stormwater pollution. However, the analysis conducted for the I-15 project showed that the increase in the amount of impervious surface would not change the beneficial-use classifications or further impair water bodies in the area. The reasonably foreseeable projects listed above will further increase impervious surface area in Utah and Salt Lake counties. These projects would also be expected to comply with Clean Water Act and appropriate State regulations to ensure they will not adversely affect water quality. In addition, the I-15 project would include measures to control stormwater runoff and would use detention basins to minimize the amounts of pollutants that are discharged into nearby surface waters. Other transportation projects in the region are also not expected to contribute to major stormwater runoff or reduce water quality because of the controls would be placed on each project to manage runoff and minimize water quality impacts.

The other transportation-related projects listed previously in Table 3.19-1 are not expected to contribute to major stormwater runoff or reduce water quality because of the controls that are placed on projects to manage runoff and minimize water quality impacts. In addition, many of these projects are improving existing roads that have no stormwater controls by adding control measures that could reduce water quality impacts. It is likely that one of the greatest contributors to future water quality impacts will be the urban development that is converting existing undeveloped land into residential, industrial, and commercial uses.

Urban runoff is the cause of about 6.2% of the water quality impairment for streams in the Utah Lake–Jordan River Watershed Management Unit (see Table 3.19-3 above). However, as development increases, this contribution will likely increase. Although development in the water quality cumulative impacts analysis area will occur with or without the I-15 project, roadway improvements in general could contribute to some development growth. It is expected that the amount of urbanized area along the Wasatch Front will increase from about 30,000 acres currently to about 70,000 acres in 2030, an increase of 40,000 acres. This urbanization would include all residential and commercial areas and the necessary infrastructure such as roads (including roads like the I-15). Not all of the 40,000 acres would be impervious surfaces, since the typical amount impervious land cover in residential areas can vary from 12% to 40% and for commercial areas from 60% to 95% (Canter 1996).

The continued urbanization of Salt Lake and Utah Counties could result in cumulative impacts to and degradation of water quality. However, this increase in urbanization would also decrease the amount of agriculture and resource extraction, which are two of the larger factors that impair water quality. It is also likely that, in the future, regulatory controls would be increased to reduce water quality impacts.

Mitigation

Section 3.12 Water Resources of this chapter provides a discussion of water quality mitigation measures. The mitigation measures include the following:

- Develop an erosion-control plan during construction; and
- Use detention basins for the I-15 project to detain runoff and reduce peak flow rate.

3.19.4.4 Wildlife and Wetland Resources

This section provides an overview of the cumulative impacts to wildlife and wetland resources from the I-15 project and other actions in the area. The ecosystems cumulative analysis includes impacts to wildlife and wetland habitat. Because Alternative 4 would have no direct effects on the June Sucker and the Ute ladies-tresses, no cumulative impacts are expected for threatened or endangered species. No cumulative impacts to threatened or endangered species are expected from the I-15 project.

The geographic scope of this analysis includes the Salt Lake, Utah, and Tooele Valleys. These three valleys were selected because they are used by migratory birds that use the wetlands as feeding and resting areas during migration, and because a decrease in wildlife habitat and wetlands in Salt Lake County could affect bird and other local wildlife populations in Tooele County. The timeframe of the cumulative impact analysis is about from the mid-1800s (pre–European settlement) through 2030. The change from historic to current wetlands and habitat availability was estimated using regional scale land cover data (Jones & Stokes 2005). The baseline year selected for the analysis (2003) was based on 2003 land cover data.

Past Conditions

Wildlife habitat, wetlands, rivers, and lakes in the Salt Lake, Utah, and Tooele Valleys (Jordan River hydrologic unit, Utah Lake hydrologic unit, and Tooele Valley hydrologic unit, respectively) have been extensively altered as a result of urban and agricultural development during the past century. The wetlands adjacent to Utah Lake and the Great Salt Lake have been extensively altered or lost, and many of the streams that flowed into Utah Lake, the Jordan River, and the Great Salt Lake have been altered for water supplies, control of stormwater, agricultural uses, and urban development. Much of the upland wildlife habitat has also been developed, and only a few areas remain on the west side of the Salt Lake and Utah Valleys. In the three valleys, there has been about a 55% reduction in wetlands and wildlife habitat. The extent of estimated historic wetlands and wildlife habitats and the current conditions are listed below.

About 45% of the estimated historic wetlands and wildlife habitats are still available in the area.

The remaining habitat is estimated below.

- Salt Lake Valley – 38% (37,333 acres);
- Utah Valley – 17% (11,100 acres); and
- Tooele Valley – 80% (56,379 acres).

Based on National Wetland Inventory data, Salt Lake County has about 7,900 acres of wetlands remaining from the historic estimate of 19,500 acres. Utah County has about 11,018 acres remaining out of the historic estimate of 66,200 acres. This is a loss of about 64% and 83%, respectively.

Future Trends

The USACE regulatory wetland program was put in place to mitigate the loss of wetlands and other waters of the U.S. through avoidance, minimization, and creation or restoration of these resources. The resulting federal policy is "no net loss of wetland acres and/or function." Although the amount of future wetlands and the associated aquatic habitat conditions are difficult to predict, these resources could be degraded by encroachment, fragmentation, and/or hydrologic modification. For example, a new road might be adjacent to an emergent marsh or might bisect the marsh. Even if the impacts from the road are mitigated, the result might be wetlands that provide diminished wildlife habitat function for some species. Similarly, such a project could alter the movement of surface water or groundwater, resulting in the direct loss of wetlands outside the specified project area.

Since no regulatory program protects uplands, the associated upland wildlife habitat (such as winter foraging areas) will continue to be developed in the future as the population in the area grows. The expected 40,000 acres in new development will affect upland habitat and some wetland habitat. Other reasonably foreseeable transit and roadway projects in the area could affect between 265 acres and 428 acres of wetlands (see Table 3.19-1), but these impacts would be mitigated. Overall, based on the projected estimates of population growth and population densities, there will continue to be a trend of converting wetlands and wildlife habitat to increasingly dense levels of development.

I-15 Project Impacts

Alternative 4 would result in a loss of wildlife habitat that is primarily heavily disturbed roadway right-of-way and urbanized lands. This conversion of lands to additional I-15 right-of-way would be range from about 300 to 400 acres, depending on the design option, and would be about 1% of what could be lost to anticipated development (about 40,000 acres by 2030) (Envision Utah 2003). With the continued development along the Wasatch Front, much of the existing wildlife habitat on the valley floors would be lost. Future development along the Front could also segment wildlife habitat. Because the steep topography limits some development in the foothills, these areas would experience less impact to wildlife habitat.

Alternative 4 would result in impacts up to 60.43 acres of wetlands, depending on the design option. Although other planned transportation projects could also result in impacts to wetlands, urban growth, regardless of the construction of roads and rails, will likely cause the greatest impact to wetlands between 2002 and 2030. However, all projects subject to a Section 404 individual permit are required to identify the least environmentally damaging practicable alternative, which is the goal of the wetland assessment component of this EIS process. In addition, all projects, including those listed in the table of reasonably foreseeable projects, are required to complete a wetland delineation from which mitigation is determined through avoidance, minimization and/or some form of creation, restoration, or enhancement. No data are available on the exact amount of wetlands to be converted to urban uses because each project is treated independently by USACE. It is expected that all direct impacts will have to be mitigated for (through creation, restoration, or enhancement) within the general vicinity of the project to satisfy the federal policy of no net loss of wetland acres and/or function.

Mitigation

Section 3.15 Wildlife and Threatened and Endangered Species provides a discussion of mitigation measures for wildlife and wildlife habitat, vegetation, wetlands, and threatened and endangered species. The mitigation measures include the following:

Develop and implement wetland mitigation sites that result in an overall no net loss of wetland functions affected by the I-15 project.

3.19.4.5 Threatened and Endangered Species

The study area includes critical habitat for the June Sucker (*Chasmistes liorus),* a federally endangered species. Populations of Ute ladies'-tresses (*Spiranthes diluvialis*), which is federally listed as a threatened species, exist in

Utah Valley, outside the project corridor. Because Ute ladies'-tresses depends on wetlands, the cumulative effects analysis for wetlands, above, also provides a trend for the Ute ladies'-tresses in the area. Future development in Utah and Salt Lake counties could also include critical habitat, however, the only critical habitat in the I-15 corridor is at the Provo River, for June sucker, and future projects are expected to complete consultation pursuant to Section 7 of the Endangered Species Act.

3.19.4.6 Cultural Resources

This section provides an overview of the cumulative impacts to cultural resources from Alternative 4 and other actions in the regional area along the I-15 corridor.

Past Conditions

Past transportation projects and urban growth have affected cultural resources of varying integrity and significance in the region.

Future Trends

Future transportation projects, including the widening and reconstruction of I-15, will affect cultural resources along the I-15 corridor. These future transportation projects will be subject to state and federal regulations regarding cultural properties. Any potential adverse impacts would be subject to avoidance and/or mitigation measures consistent with state or federal regulations and UDOT's current cultural resources guidelines. Other reasonably foreseeable actions presented in Table 3.19-1 will contribute to the additional cumulative effects on cultural resources. These additional, future projects may alter the integrity of cultural resources and impact their eligibility for the National Register of Historic Places.

I-15 Project Impacts

Provo/Orem Options A, B, C and D of Alternative 4 would have an adverse effect on the Provo Viaduct. American Fork Main Street Options A, B and C of Alternative 4 would have an adverse effect on the two historic structures located in American Fork at 150 West 300 South (Map/Site Reference # 50) and 360 W. 200 South (Map/Site Reference # 56).

Alternative 4 would require ground disturbance, construction, and operation and maintenance activities. These activities would disturb comparatively small areas, and primarily affect right-of-way corridors that have already been disturbed. Although construction activities under Alternative 4 would contribute to the cumulative loss of integrity of significant historical properties in the regional area, the contribution would be avoided, minimized, and mitigated to the extent practicable.

Mitigation

There are no mitigation commitments specifically associated with cumulative impacts. The mitigation for the direct and indirect impacts will minimize any potential cumulative impacts in the region.

3.19.4.7 Greenhouse Gases and Global Climate Change

The issue of global climate change is an important national and global concern that is being addressed in several ways by the Federal government. The Transportation sector is the second largest source of total greenhouse gases (GHG) in the U.S., and the greatest source of carbon dioxide (CO_2) emissions – the predominant GHG. In 2004, the transportation sector was responsible for 31 percent of all U.S. CO_2 emissions. The principal anthropogenic (human-made) source of carbon emissions is the combustion of fossil fuels, which account for approximately 80 percent of anthropogenic emissions of carbon worldwide. Almost all (98 percent) of transportation-sector emissions result from the consumption of petroleum products such as motor gasoline, diesel fuel, jet fuel, and residual fuel.

Recognizing this concern, FHWA is working with other modal administrations through the DOT Center for Climate Change and Environmental Forecasting to develop strategies to reduce transportation's contribution to greenhouse gases - particularly CO_2 emissions - and to assess the risks to transportation systems and services from climate changes. In Utah, the Governor's Blue Ribbon Advisory Council on Climate Change (BRAC) identified measures that the state could take to minimize the impacts of transportation related GHG. The recommended measures include reducing vehicle mile travelled (VMT) through developing and encouraging the use of mass transit, ridesharing, telecommuting. Other strategies outlined in the BRAC report to reduce CO_2 at the source include promoting the use of low carbon fuels such as alternative fuels, bio-fuels and hybrid vehicles, vehicle technologies resulting in greater fuel efficiency and implementing an idle reduction program for school busses and heavy duty trucks.

Because climate change is a global issue, and the emissions changes due to project alternatives are very small compared to global totals, FHWA did not attempt to calculate the GHG emissions associated with the alternatives. Because GHGs are directly related to energy use, the changes in GHG emissions would be similar to the changes in energy consumption presented in Section 3.20 of this EIS, which indicates a 3 to 4 percent increase for the Preferred Alternative relative to the No-Build. The relationship of current and projected Utah highway CO_2 emissions to total global CO_2 emissions is presented in the Table 3.19-4 below. Utah highway CO_2 emissions are expected to decrease by 6.2% between 2006 and 2030. The benefits of the fuel economy and renewable fuels programs in the 2007 Energy Bill more than offset growth in Utah vehicle miles of travel (VMT); the UDOT Planning Division predicts that statewide VMT will increase by 58% between 2006 and 2030. This table also illustrates the size of the project corridor relative to total Utah travel activity.

Table 3.19-4: Current and Projected Utah Highway CO_2 Emissions

Global CO2 emissions, 2006, MMT[1]	Utah highway CO2 emissions, 2006, MMT	Projected Utah 2030 highway CO2 emissions, MMT	Utah highway emissions, % of global total (2006)	Project study area VMT, % of statewide VMT (2006)
27,578	16.2	15.2	0.06%	6.1%

[1] EIA, International Energy Outlook 2007 (MMT = million metric tons)

3.20 Energy

Energy is consumed during the construction and operation of transportation projects. It is used during construction to manufacture materials, transport materials, and operate construction machinery. Energy used during project operation includes fuel consumed by vehicles using the project and a negligible amount of energy for signals, lighting, and maintenance. Fuel consumption depends on the vehicle miles traveled (VMT) and travel conditions, such as vehicle type, speed of travel, roadway grade, and pavement type. For any given vehicle, speed is the most important factor affecting energy consumption.

Common units of energy measurement are joules and British Thermal Units (BTUs). Because these are relatively small units, energy is often reported in giga joules (billion joules) and million BTUs (MBTUs). One giga joule is the equivalent of 0.95 MBTUs. Even larger amounts of energy are reported in million MBTUs (Tera BTUs). One gallon of gasoline contains approximately 0.13 MBTUs. As a point of reference, the caloric intake for an adult person is approximately 3 giga joules per year (2,000 Calories = 0.008 giga joules).

Since publication of the DEIS, the MPO updated their traffic model to version 6.0. The FEIS incorporates this model version, which reduces expected VMT under the Build and No Build scenarios. This reduces the energy consumption data presented in Table 3.20-1, which has been updated since the DEIS.

3.20.1 Affected Environment

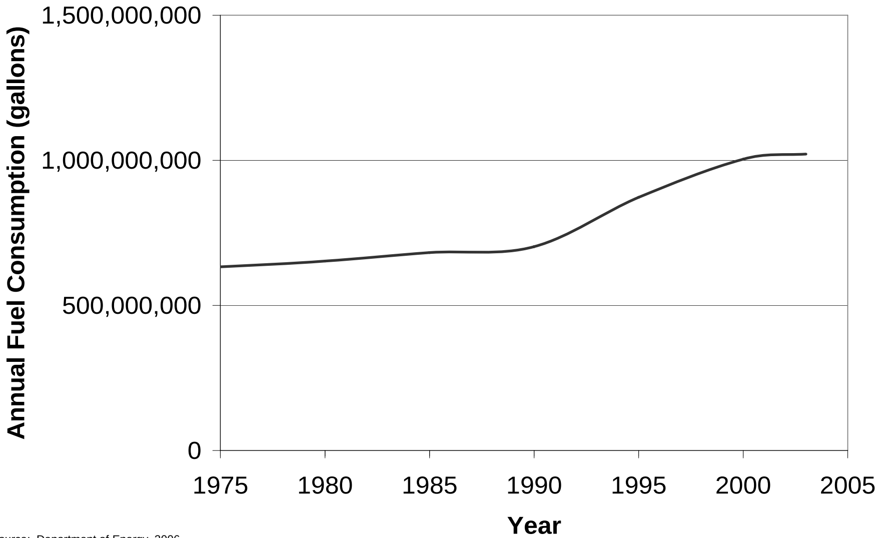
The transportation sector is very energy-dependent upon petroleum. In 2005, transportation within the United States consumed approximately 28,000 Tera BTUs of petroleum and that amount is expected to increase to 39,000 Tera BTUs by 2030 (USDOE 2006a). Gasoline consumption in the United States is projected to increase an average of 1.2 percent annually through 2030.

Vehicle fuel consumption is the primary component of operating costs paid by individual users of transportation facilities. Road geometry, surface conditions, and traffic flows substantially affect the operating efficiency of vehicles, and consequently of total energy consumption.

Nationwide trends over the last 10 to 15 years reflect a lack of progress in fuel economy. New technologies used in hybrid vehicles change the horizon for fuel economy projections and indicate that improvements on the order of 100 to 200 percent may be possible (EPA 2005). Recent developments suggest various potential pathways for possible future fleet wide fuel economy improvements, including voluntary commitments by some manufacturers to improve the fuel economy of certain portions of their fleets by as much as 25 percent.

In 2003, petroleum use in the state of Utah accounted for approximately 39 percent of all energy consumption (USDOE 2006b). Approximately 49 percent of petroleum use is for motor vehicle fuel. During this same timeframe, 1.02 billion gallons of fuel were consumed by motor vehicles in the state of Utah (Figure 3.20-1). Transportation energy consumption in the state of Utah increased by approximately 1.7 percent annually during the 1980s, 4.9 percent annually during the 1990s, and has remained relatively stable since the turn of the century. Total statewide annual energy consumption was 705 trillion BTUs in 2003 (USDOE 2006b).

Figure 3.20-1: State of Utah Fuel Consumption Trend



Source: Department of Energy, 2006

3.20.2 Energy Impacts

The I-15 Corridor Project would create the greatest energy demands in the following areas: long-term operational energy consumption related to vehicle travel and short-term construction-related energy consumption.

For the I-15 alternatives, fuel consumption rates can be differentiated by comparing changes in traffic operations, as measured by VMT and changes in traffic speed. This information was obtained from the travel demand forecasting models developed by the Wasatch Front Regional Commission and the Mountainland Association of Governments. Fuel consumption is proportional to distance traveled and is affected by speed. Fuel economy increases with speed up to about 30 miles per hour (mph), is fairly flat between about 30 mph and 60 mph, and decreases as speed increases above that point (USDOE 2002).

3.20.2.1 Operation Impacts

The analysis of operational energy within the study area is based on the transportation analyses prepared for this project. By using daily Vehicle Miles Traveled (VMT) and speed values calculated from the transportation forecasting model for the study area, net changes in overall energy consumption caused by operation of the alternatives were assessed.

The energy consumption calculations were made by calculating the VMT and speed for the roadway network in the study area for three periods each day: AM peak, PM peak, and off-peak. Energy consumption was calculated by multiplying the VMT for each roadway link during each period with the appropriate average vehicle fuel consumption for the link's speed. The fuel consumption rate in gallons of fuel consumed per mile of travel is the inverse of fuel economy in units of mpg.

The alternatives were compared based on daily differences in fuel consumed by traveling vehicles (USDOT 1980). This value is approximate for each alternative and does not include the minimal energy used for facility maintenance and signal operation. However, it provides a good basis for comparing the alternatives.

Traffic is predicted to increase in the project area by the year 2030, independent of construction of this project. The estimated 2030 energy consumption, resulting from daily vehicle operations in the study area, is shown in Table 3.20-1. Consumption is calculated by using average network speed to calculate a fuel consumption rate, and multiplying that rate by VMT (Transportation Energy Data Book: Edition 22, U.S. Department of Energy, Oak Ridge National Laboratory, Tennessee, 2002).

Table 3-20.1: 2030 Energy Consumption by Alternative

Alternative	Daily VMT	Average Network Speed (mph)	Daily Energy Consumption		
			Gallons	Giga Joules	MBTUs
Alternative 1, No Build	19,565,000	36.0	628,040	85,950	81,850
Alternative 4, I-15 Widening and Reconstruction, with Option A	20,424,000	38.5	655,610	89,720	85,450
Alternative 4, I-15 Widening and Reconstruction, with Option B	20,312,000	38.4	652,020	89,230	84,980
Alternative 4, I-15 Widening and Reconstruction, with Option C	20,271,000	38.3	650,700	89,050	84,810
Alternative 4, I-15 Widening and Reconstruction, with Option D	20,275,000	38.3	650,830	89,060	84,820

In 2030, the total number of daily VMT in the energy analysis study area would be approximately 19.5 million for the Alternative 1 No Build and 20.3 million for all four build options under Alternative 4. As the American Fork Main Street options A, B and C have the same VMT, a separate operational energy consumption analysis for this location was not calculated as there would be no differences among the three options.

In addition, average traffic speeds are predicted to be equal among all build options, at approximately 38 mph, which is 5.5 percent faster than average traffic speeds for the Alternative 1 (62 mph). These results indicate that neither VMT nor average network speeds would change noticeably for the options under Alternative 4. This indicates that energy consumption would remain approximately the same among all of the Alternative 4 build options. However, the increased freeway capacity associated with Alternative 4 would increase the daily VMT in the energy analysis study area by approximately four percent as compared with the Alternative 1 No Build.

3.20.2.2 Construction Impacts

Energy is consumed both directly and indirectly during project construction. Direct energy consumption includes the energy used to operate construction machinery, provide construction lighting, and produce and transport materials such as asphalt. Indirect energy consumption includes activities such as manufacturing and maintaining construction equipment, and the energy consumed by workers commuting to the project site. Because direct one-time energy consumption for roadway projects is much greater than indirect energy consumption and indirect energy consumption is difficult to define, only direct energy consumption is considered in this evaluation (Caltrans 1983). More of the construction energy consumption is in the form of petroleum than electricity.

The energy consumption required to complete a project is proportional to the project size and the nature of the work involved. For projects of a specific type, the energy required for construction is proportional to the project cost, as the project cost is directly related to the project size. As a result, energy consumption for a specific project can be estimated based on its cost and type. Caltrans has developed construction energy factors that were related to 1977 construction dollars (Caltrans 1983). The U. S. Department of Labor (USDOL) tracks a price index for highway and street construction (USDOL 2002). Using the highway and street construction price index, the energy factors can be referenced to year 2002 dollars (Table 3.20-2). Construction energy consumption factors represent a simplified relationship between project size and energy consumption. The results obtained from their use are not exact, but provide a basis of comparison between alternatives.

Table 3.20-2: Construction Energy Consumption Factors (2002 Dollars)

Facility Type	Factor (MBTU / thousand dollars)
Rural Freeway	26.5
Rural Conventional Highway	25.2
Rural Freeway Widen	16.5
Rural Conventional Highway Widen	17.8
Urban Freeway	10.5
Urban Conventional Highway	9.6
Urban Freeway Widen	9.4
Urban Conventional Highway Widen	8.9
Interchange	26.8

In addition to the energy directly consumed by vehicles and used for facility operation and maintenance, transportation systems indirectly consume energy. For example, the manufacturing and routine maintenance of vehicles requires energy. Indirect energy consumption would vary little between the alternatives because construction of one alternative rather than another is not expected to affect people's decisions to purchase new vehicles or have maintenance completed on their current vehicles. Indirect energy consumption includes all forms of energy, as it accounts for manufacturing and maintenance of all resources associated with, but not part of, the facility, such as the tires of cars that drive on I-15.

Construction energy consumption was estimated for Alternative 4 with Options A through D in the Provo to Orem area by estimating the energy consumed based on the project's construction cost. The build alternatives fall into the Urban Freeway Widen category and the approximate construction energy consumption factor for this category (adjusted to year 2002 construction cost dollars) is 9.4 MBTUs per thousand 2002 dollars of construction cost.

During construction, Alternative 4 would result in the consumption of energy to manufacture and transport materials, as well as operate construction equipment. The total energy that would be consumed for each build option under Alternative 4, over the course of the construction period, is presented in Table 3.20-3. The values shown correspond to between 4.2 and 4.6 percent of the energy consumed in the state of Utah in 2003. This consumption would not place substantial additional demand on energy sources or fuel availability in the state during the construction period.

Table 3.20-3: Total Construction Energy Consumption

Alternative	Construction Cost (million 2002 dollars)[1]	Energy Consumption	
		Giga Joules	MBTUs
Alternative 4, Provo/Orem Option A	3,277	32,400,000	30,800,00
Alternative 4, Provo/Orem Option B	3,231	32,000,000	30,400,00
Alternative 4, Provo/Orem Option C	3,067	27,400,000	28,800,00
Alternative 4, Provo/Orem Option D	3,021	30,900,00	28,400,00

[1] Construction costs were developed in 2006 dollars but were discounted to 2002 dollars for this analysis.

3.21 Short-Term Uses versus Long-Term Productivity

Short-term impacts would occur primarily during and immediately after the construction of the facility. As described in Section 3.18 Construction Impacts, the construction phase would temporarily affect water quality, vegetation, wetlands, fisheries, traffic flow, noise, air quality, and socio-economic conditions. However, mitigation measures would be used to minimize any adverse temporary impacts.

Long-term impacts would be beneficial. Traffic congestion would be reduced and safety improved. More efficient energy use and a decrease in vehicle emissions would result.

The proposed improvements to the I-15 corridor are based on state-level, municipal planning organization, county and local municipal planning for land use and transportation facilities. These planning activities have considered the present and future need for transportation service within the context of present and future land use development. Thus, the short-term impacts and use of resources is consistent with the maintenance and enhancement of long-term productivity. These benefits apply to the immediate vicinity of the highway, the cities within the corridor, and the state of Utah.

3.22 Irreversible and Irretrievable Commitment of Resources

Construction and use of the proposed project would require the expenditure of various types of resources, including construction materials, fuels, land, labor, and financial assets. Expenditure of these resources would require an irreversible commitment during the life of the project. Others are not retrievable even beyond that time.

Land within the right-of-way would be unavailable for other uses during the time that it is used as a highway facility. Most of this land is already impacted by the existing facility. The acquisition of additional right-of-way that would be required for the addition of traffic lanes and other improvements under Alternative 4 would slightly increase the amount of land that would not be available for other purposes. Conversion of this land from its present use would be irreversible during the life of the facility. However, the land could be converted to another use at the time that the proposed facility is no longer needed. However, such a conversion is not likely to be necessary or desirable within the foreseeable future.

Considerable amounts of fuels, labor, and construction materials would be expended in the construction of the highway facility. These resources are generally not retrievable. However, their use is not expected to have an adverse effect on the continuing supply for other purposes. The commitment of these resources is based on a public policy that the project would provide measurable benefits to the residents of the area. These benefits include improved access to communities, a reduction in traffic congestion, a higher level of safety, an improved availability of community services, and increased opportunities for economic development and job creation.

A substantial expenditure of public funds would be required to construct the proposed project. These funds, which are derived from taxes imposed at different levels of government, are not retrievable. However, their use would be the result of the decision by public officials to provide facilities that are needed by the citizens of the area. The expenditure of these funds would also create new opportunities for economic activities that would result in the generation of increased tax revenues.

3.23 Permits and Final Approvals Required

Implementation of Alternative 4 will require the permits shown in Table 3.23-1.

Table 3.23-1: Required Permits and Clearances

Permit/Clearance	Granting Agency(ies)	Applicant
Federal Permits, Reviews and Approvals		
Section 404 Permit (Clean Water Act)	USACE	UDOT
Section 401 of the Clean Water Act Certification	Utah Division of Water Quality	UDOT
Section 402 Permit (UPDES)	Utah Division of Water Quality	Contractor
Approval of Addition or Modification of Access Points	FHWA	UDOT
Section 7 Consultation and Biological Assessment /Incidental Take Statement	USFWS	FHWA/UDOT
Section 106 of the National Historic Preservation Act	Utah SHPO and Advisory Council on Historic Preservation	FHWA/UDOT
Blanket Certification (prior notice)	Federal Energy Regulatory Commission	Gas company
State Permits, Reviews and Clearances		
Stream Alteration Permit	Utah Division of Water Rights	UDOT
Air Quality Approval Order	Utah Division of Air Quality	Contractor
Certificate of Registration	Utah Division of Wildlife Resources	Contractor
Approval of Remediation Work Plan	UDEQ or EPA	UDOT
Construction-related permits for all of the above	Various agencies	Contractor
Local permits and Clearances		
Floodplain Development Permit	Local jurisdictions	UDOT

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3.24 Comparison of Alternatives

Table 3.24-1 summarizes the impacts of Alternative 4 on resources evaluated in this chapter and Chapter 4. It provides a comparison among Options A, B, C, and D in the Provo/Orem area; and among Options A, B, and C in the American Fork Main Street area. The second column in the table labeled "Alternative 4 Totals (Common Area Only)" provides the resource impact information for those sections of I-15 that are outside the Provo/Orem Option area and the American Fork Main Street Option area. To determine the impact of Alternative 4 for the entire 43-mile long corridor for a given resource, the information for any option in the Provo/Orem Option area and for any American Fork option should be added to the information in the "Alternative 4 Totals" column. The far right column provides the minimum and maximum range of Alternative 4 impacts for the 43-mile long corridor. Impacts from the Preferred Alternative are listed in parentheses in the final column.

Table 3-24.1: Summary of Alternative 4 Impacts by Design Option

Impact Category	Alternative 4 Totals (Common Area Only) (Preferred)	Provo/Orem Option A Only	Provo/Orem Option B Only	Provo/Orem Option C Only	Provo/Orem Option D Only (Preferred)	American Fork Main Street Option A Only	American Fork Main Street Option B Only	American Fork Main Street Option C Only (Preferred)	Range of Alternative 4 Total Impacts (Preferred in parentheses)
Land acquired	354 acres	137 acres	118 acres	89 acres	75 acres	49 acres	61 acres	63 acres	478 to 544 acres (492)
Prime Farmland	0 acres	0.15 acres	0.15 acres	0 acres	0 acres	1.43 acres	29.81 acres	4.92 acres	1.43 to 29.96 acres (4.92)
Farmland of Statewide Importance	0 acres	9.08 acres	9.08 acres	0.45 acres	0.45 acres	9.50 acres	12.66 acres	10.62 acres	9.95 to 21.74 acres (11.07)
Farmland of Unique Importance	3.54 acres	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres	0 acres	3.54 acres (3.54)
Agriculture Protection Areas	0.25 acres	0 acres	0 acres	0 acres	0 acres	0 acres	5.09 acres	0 acres	0.25 to 5.34 acres (0.25)
Relocations									
Housing Units	12	73	19	55	2	1	3	1	15 to 88 (15)
Businesses	20	39	38	8	16	9	9	10	37 to 69 (46)
Noise receptors above Noise Abatement Criteria	428	291	291	291	291	103	124	103	822 to 843 (822)
Wetlands	24.75 acres	27.68 acres	27.89 acres	19.62 acres	16.95 acres	5.28 acres	7.79 acres	5.25 acres	46.95 to 60.43 acres (46.95)
Threatened and Endangered Species and Habitat	"No direct effects" for 16 species. "No effects likely" for 4 species. *No differences between design options.*								"No direct effects" for 16 species. "No effects likely" for 4 species.
Adverse impacts to historic properties	0	1	1	1	1	2	2	2	3 (3)
Hazardous Waste sites	3 potential contaminant sites within 0.10 mile. Low potential for impacts. *No differences between design options.*								3 potential contaminant sites within 0.10 mile. Low potential for impacts.
Section 4(f) Use (Chapter 4)									
Use	0	1	1	1	1	2	2	2	3 (3)
de minimis	10	5	3	3	2	2	2	1	13 to 17 (13)

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